NSW Agriculture & Fisheries

ANNUAL REPORT 1987~88

(Following page:) At the unveiling of a commemorative plaque at Agview 88, from left to right: Dr K. P. Sheridan, the Honourable Ian Armstrong MP, Minister for Agriculture and Rural Affairs, and the Honourable David Hay MP, Minister for Local Government and Planning.

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Division of Agricultural Services

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NSW Agriculture & Fisheries

ANNUAL REPORT 1987 ~ 88

The Hon. Ian Armstrong OBE MP
Minister for Agriculture
and Rural Affairs
Sydney

Sir,

I have the honour to present a report reviewing the activities of NSW Agriculture & Fisheries for the year ended 30 June 1988.

KP Sheridan

K. P. SHERIDAN
Director-General

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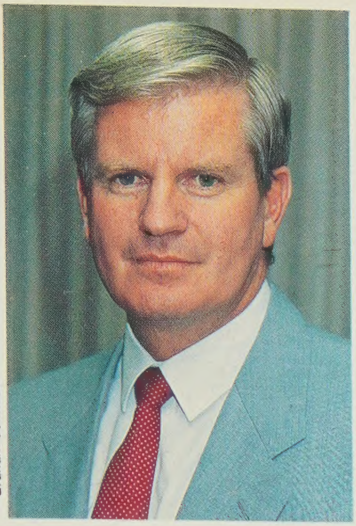

Graham Johnson

FOREWORD

This report, my first as Director-General, outlines the extraordinarily diverse activities of NSW Agriculture & Fisheries during a year of significant change. The Department has operated in an environment where the thrust to both State and Federal Government policies is to increase public sector efficiency and to improve the nation's trading performance. Commodity prices continued to rally and farm incomes are expected to rise 68 per cent on the previous year. Wool achieved record prices and became Australia's and NSW's prime export earner. Overall, agriculture contributed $6,709.3 million to the nation's export earnings for the year to May 1988, 18 per cent of total. Agricultural exports are up 20 per cent over the same period last year.

Agriculture's improving fortunes were seriously threatened when unacceptable levels of pesticide resides were detected in beef exports to the United States. NSW Agriculture & Fisheries acted quickly and led the way in rectifying the situation, in cooperation with the Commonwealth and the other states.

A Liberal-National Coalition Government was formed following the State election held in March, 1988. Those of the new Government's policies that concern the Department have already been implemented or are in the process of being implemented.

At a fitting time, the Anzac Day long weekend, the Department celebrated Australia's bicentenary by conduction a program of agricultural displays and demonstrations at historic Camden Park. The celebrations aimed at bringing agriculture to as many people as possible, and Camden Park's location on the south-western edge of Sydney made it an ideal venue. The event, called Agview 88, attracted about 35 000 visitors over the three days. Agview commemorated the pivotal role that agriculture played, and still plays, in Australia's development.

Organisational developments include changing the Department's name to include fisheries, to reflect better the importance of the fishing industries, and angling, to the State and to the Department. The Department has adopted the working title of NSW Agriculture & Fisheries.

A moderate level of restructuring has been necessary to enable financial and staff targets to be met whilst we continue to maintain services. The Department strives, successfully, I believe, to operate effectively and efficiently and with the highest standards of professionalism. Its organisation is not fixed, and will continue to evolve to meet the changing needs of the agricultural and fishing industries of New South Wales.

Sheridan

KEVIN SHERIDAN
Director-General

CHARTER

The Department of Agriculture was initially an offshoot of the Department of Mines. The creation of the Department of Agriculture was, then, an administrative rather than a legislative decision. The fisheries of New South Wales were placed under Ministerial control as 'Chief Secretary's Department—Fisheries Branch' in 1911. The Department of State Fisheries was formed in 1976, then integrated with the Department of Agriculture in 1983. The Fisheries and Oyster Farms Act 1935 sets out the powers and functions of the Minister in relation to fisheries generally.

The name of the Department was changed from Agriculture to Agriculture and Fisheries to give due recognition to both the importance of the State's fisheries and the Fisheries staff who joined the Department in 1983 following the amalgamation of the two bodies. The Department has adopted the working title of **NSW Agriculture & Fisheries**.

CORPORATE GOALS

The goals of NSW Agriculture & Fisheries are to improve the prosperity and quality of life of both the rural and urban communities of New South Wales by:

1. Promoting the efficient, sustainable use of the agricultural, livestock and fisheries resources.
2. Protecting and enhancing the environment.
3. Safeguarding and improving the productivity and profitability of our agricultural, livestock and fishing industries.
4. Encouraging diversification and development of new enterprises within those industries.
5. Developing and maintaining effective liaison with each industry.
6. Fostering the development and management of recreational fishing.
7. Encouraging the marketing of safe, acceptable produce.
8. Assisting in seeking, identifying and developing markets.
9. Ensuring efficient, cost-effective use of revenue in attaining these goals.

AIMS AND OBJECTIVES

Arising from the corporate goals are the following objectives:

GENERAL OBJECTIVES

STAFFING

1. To maintain an encouraging and concerned attitude towards the welfare of employees, and to encourage their personal development.

DEPARTMENT'S CLIENTS

2. To provide services to the total community with emphasis on efficient producers to maximise the benefits to New South Wales.

COMPETING SERVICES

3. To provide services that will not compete when satisfactory alternative services are available or can be encouraged to develop.

STYLE OF ACTION

4. To anticipate and seek solutions to production, management and marketing problems.
5. To maintain a modern information system to communicate with the public.

REGIONAL OBJECTIVE

6. To deliver to rural industries programs and services appropriate to local conditions and needs and consistent with departmental objectives.

DIVISIONAL OBJECTIVE

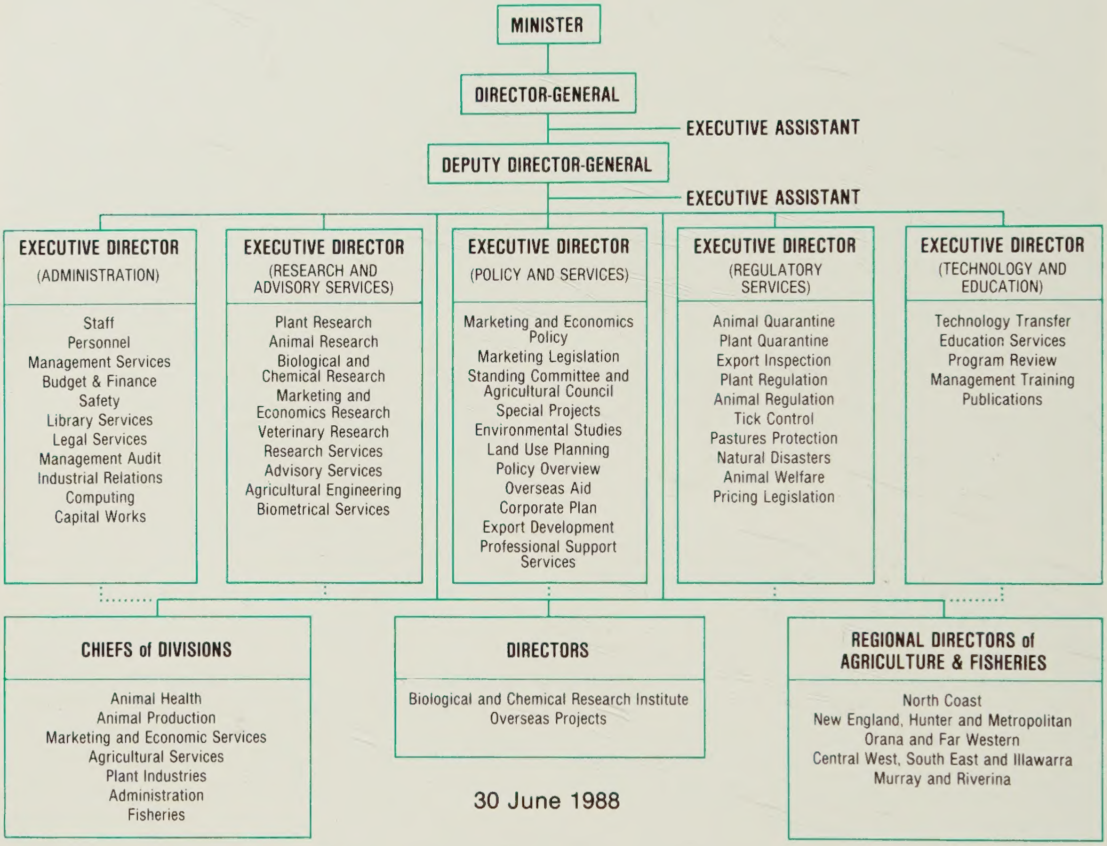
7. To design and evaluate programs and services for rural industries and to provide support to regions in the application of programs consistent with departmental objectives.

SERVICES OBJECTIVES

MARKETING

8. To improve the matching of producer decisions with market demands.
9. To provide information on the analysis and availability of markets for primary produce.
10. To monitor the economic situation in key rural industries and advise government and industry of trends, and to provide information to encourage the efficient allocation of resources.

ORGANISATION STRUCTURE
NSW AGRICULTURE & FISHERIES


MINISTER
DIRECTOR-GENERAL
EXECUTIVE ASSISTANT
DEPUTY DIRECTOR-GENERAL
EXECUTIVE ASSISTANT
EXECUTIVE DIRECTOR (ADMINISTRATION)
Staff
Personnel
Management Services
Budget & Finance
Safety
Library Services
Legal Services
Management Audit
Industrial Relations
Computing
Capital Works
EXECUTIVE DIRECTOR (RESEARCH AND ADVISORY SERVICES)
Plant Research
Animal Research
Biological and Chemical Research
Marketing and Economics Research
Veterinary Research
Research Services
Advisory Services
Agricultural Engineering
Biometrical Services
EXECUTIVE DIRECTOR (POLICY AND SERVICES)
Marketing and Economics Policy
Marketing Legislation
Standing Committee and Agricultural Council
Special Projects
Environmental Studies
Land Use Planning
Policy Overview
Overseas Aid
Corporate Plan
Export Development
Professional Support Services
EXECUTIVE DIRECTOR (REGULATORY SERVICES)
Animal Quarantine
Plant Quarantine
Export Inspection
Plant Regulation
Animal Regulation
Tick Control
Pastures Protection
Natural Disasters
Animal Welfare
Pricing Legislation
EXECUTIVE DIRECTOR (TECHNOLOGY AND EDUCATION)
Technology Transfer
Education Services
Program Review
Management Training
Publications
CHIEFS of DIVISIONS
Animal Health
Animal Production
Marketing and Economic Services
Agricultural Services
Plant Industries
Administration
Fisheries
DIRECTORS
Biological and Chemical Research Institute
Overseas Projects
REGIONAL DIRECTORS of AGRICULTURE & FISHERIES
North Coast
New England, Hunter and Metropolitan
Orana and Far Western
Central West, South East and Illawarra
Murray and Riverina

30 June 1988

AGRICULTURAL EDUCATION

11. To help ensure that there is an appropriate level of skills and knowledge training in agriculture.
12. To improve consumer education about agricultural commodities.

DISASTER MANAGEMENT

13. To assist producers affected by disasters, and who can be viable in the long term, to remain in production.
14. To encourage efficient resource management during disasters, thereby reducing land degradation and the depletion of essential breeding stock.
15. To encourage self-help by producers to achieve natural disaster preparedness.

REGULATION

16. To maintain and develop a prudent set of regulations to promote the long-term efficiency, safety and harmony of the agricultural, livestock and fishing industries.
17. To ensure that relevant government regulations are understood by the community.

INDUSTRY OBJECTIVES

IMPROVEMENT

18. To assist in relating genotypes and breeding systems to the various New South Wales production and marketing environments.
19. To encourage development of genotypes capable of increased productivity and profitability.

20. To foster the sale and export of demonstrably superior genetic material.
21. To ensure the availability of a diversity of improved and appropriate genetic material.

PROTECTION—PESTS AND DISEASES

22. To ensure that the means are available to protect plant, livestock and fish industries from pests and diseases.
23. To improve and operate an agricultural and fisheries quarantine and export inspection service.
24. To conduct programs in plant and animal health to minimise the economic effects of diseases and to improve productivity and market quality of animals, plants and fish, and their products.

ANIMAL WELFARE

25. To protect and enhance the welfare of economic livestock and to protect animals against harmful husbandry and experimental procedures.

PUBLIC HEALTH

26. To conduct programs to minimise the spread of diseases from animals to the human population.

ENVIRONMENT

27. To provide advice on the use of land to ensure the maintenance of a high quality environment.
28. To protect the environment by encouraging efficient adoption of approved practices in the use of all agricultural and fisheries resources, including recreational fishing.

PRODUCTION

29. To improve rural productivity by identifying and helping to overcome production constraints.
30. To provide advice on all technical and economic aspects of agricultural, livestock and fisheries production, to enable the most efficient use of resources.

PRODUCTS

31. To encourage improvement in product quality and in the harvesting, storage and distribution of agriculture and fishery products.

CORPORATE PLANNING

The Department produced the 1988 Strategic Plan which outlined its response to changes in the agricultural industries, in Government and community attitudes and in international trade. The strategy was presented in two parts: six areas of focus that are the Department's priorities for the immediate future; and the future direction of the 17 budget programs comprising the Department's mainstream activities. The six areas of focus are:

- export development
- agricultural and veterinary chemicals
- land use and environment
- farm business management
- computer technology
- staff training and development.

A copy of the strategy was issued to every member of staff.

ACCESS

The Department's principal place of business is the McKell Building, Rawson Place, Sydney, telephone (02) 217 6666, telex AA72418.

The Department of Agriculture's administration is regionalised, with each of the five regions being managed from its headquarters by a Regional Director of Agriculture and Fisheries, located as follows:

REGION 1: NORTH COAST REGION
North Coast Agricultural Institute
Wollongbar, NSW 2480
Telephone (066) 24 0200

REGION 2: NEW ENGLAND, HUNTER AND METROPOLITAN REGION
New South Wales Government Offices
35–37 Abbott Street
Gunnedah, NSW 2380
Telephone (067) 42 9200

REGION 3: ORANA AND FAR WESTERN REGION
New South Wales Government Offices
37 Carrington Avenue
Dubbo, NSW 2830
Telephone (068) 81 1222

REGION 4: CENTRAL WEST, SOUTH EAST AND ILLAWARRA REGION
New South Wales Government Offices
181–187 Anson Street
Orange, NSW 2800
Telephone (063) 63 8245

REGION 5: MURRAY AND RIVERINA REGION
Yanco Agricultural Institute
Yanco, NSW 2703
Telephone (069) 53 0211.

Within the regions, and including metropolitan establishments that are outside the regional system, the Department has 146 public offices of one kind or another in 128 separate areas. (The difference between the two figures is explained by the presence of more than one departmental office in some locations.)

HOURS OF BUSINESS

Normal hours of business are 8:30 am to 4:30 pm, Monday to Friday.

MANAGEMENT AND STRUCTURE

The Department's structure comprises an executive group, production and service divisions, and regions.

THE EXECUTIVE

The Executive is responsible for the overall management of the Department, and for ensuring that government agricultural policy is efficiently implemented.

The line of command is from the Minister through the Director-General, the Deputy Director-General and five Executive Directors. The Executive constitutes a Board of Management, responsible for determining policy. See the organisation chart on page 4.

DIVISIONS

The divisions may be divided into 'production' and 'service' divisions, each headed by a Chief. The production divisions are concerned with agricultural or fisheries technology and the provision of specialised technical services to the producer. They are the Divisions of Animal Health, Animal Production, Fisheries and Plant Industries. The service divisions, which have a supportive role in departmental activities, include the Divisions of Marketing and Economic Services, Agricultural Services and Administration, and the Biological and Chemical Research Institute.

REGIONS

Each Region is under the control of a Regional Director of Agriculture and Fisheries, a position of equal status to a Chief of Division. The boundaries of the five agricultural regions are shown in the map on page 7.

PRINCIPAL OFFICERS

At 30 June 1987 the Department's principal officers were:

Minister for Agriculture and Fisheries
The Hon. I. A. Armstrong, OBE, MP

Director-General
K. P. Sheridan, BScAgr, MS, PhD

Deputy Director-General
G. R. Gregory, BScAgr, RDOen

Executive Director (Administration)
P. J. Small, Personnel Admin Cert

Executive Director (Technology and Education)
S. G. Grimmett, BAgrSc, MSc, PhD

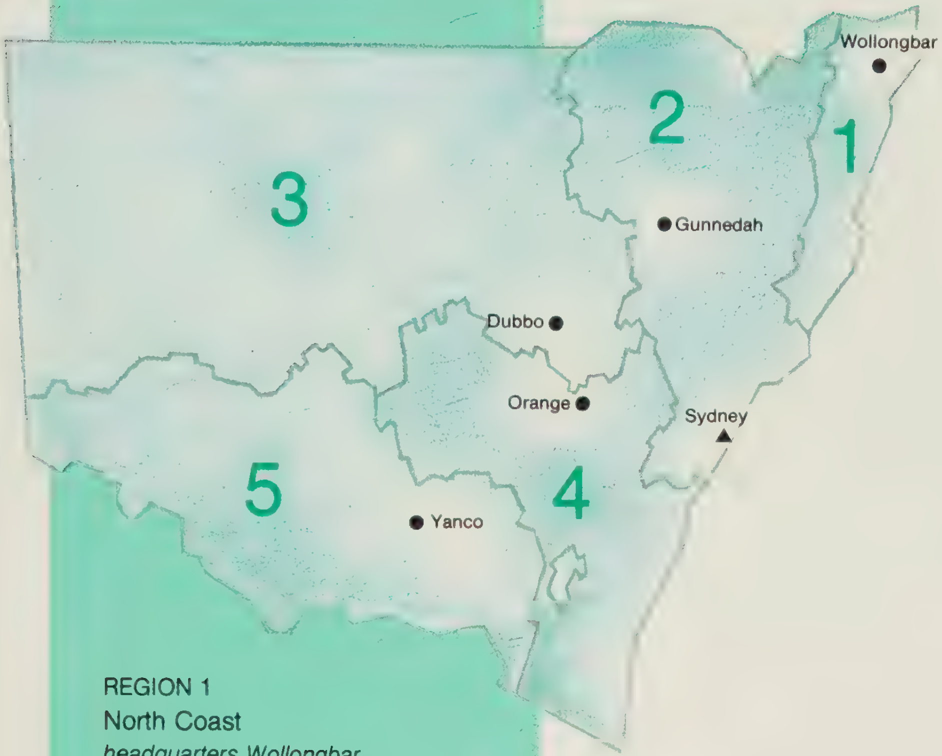
Executive Director (Policy and Services)
C. Gellatly, BAgrEcon, MComm, PhD

Executive Director (Regulatory Services)
B. D. Buffier, BRurSc(Hons), MEcon

Executive Director (Research and Advisory Services)
G. C. File, HDA(Hons), BRurSc(Hons), MRurSc

Executive Assistant to the Director-General
R. J. Jessup, BScAgr

THE AGRICULTURAL REGIONS OF NSW



Wollongbar
2
1
3
Gunnedah
Dubbo
Orange
Sydney
5
4
Yanco

REGION 1
North Coast
headquarters Wollongbar

REGION 2
New England, Hunter & Metropolitan
headquarters Gunnedah

REGION 3
Orana & Far West
headquarters Dubbo

REGION 4
Central West, South-East & Illawarra
headquarters Orange

REGION 5
Murray & Riverina
headquarters Yanco

Marcus Stokes

The Executive. From left to right: Mr Barry Buffier, Executive Director (Regulatory Services); Mr Graham Gregory, Deputy Director-General; Mr Phil Small, Executive Director (Administration); Dr Stan Grimmett, Executive Director (Technology and Education); Dr Kevin Sheridan, Director-General; Mr Geoff File, Executive Director (Research and Advisory Services). Absent: Dr Col Gellatly, Executive Director (Policy and Services).

Executive Assistant to the Deputy Director-General
F. S. Benecke, WDA, HDRE

Chief, Division of Agricultural Services
P. A. Witschi, BScAgr

Chief, Division of Animal Health
P. J. Mylrea, MVSc, PhD

Chief, Division of Animal Production
Vacant

Chief, Division of Fisheries
L. F. Reynolds, BSc(Hons), MSc

Chief, Division of Marketing and Economic Services
J. Booth, BScAgr, BSc(Hons)

Chief, Division of Plant Industries
L. Cook, BScAgr, PhD

Chief Administrative Officer
C. J. Cashman, MBA, BComm, BBus

Director of the Biological and Chemical Research Institute
M. Casimir, BScAgr(1st Class Hons)

Regional Director of Agriculture and Fisheries, Region 1
B. D. Scarsbrick, BA(Sc), 4th yr AgrSc (Massey, NZ), HDA

Regional Director of Agriculture and Fisheries, Region 2
E. J. Corbin, BScAgr

Regional Director of Agriculture and Fisheries, Region 3
O. R. Southwood, BScAgr

Regional Director of Agriculture and Fisheries, Region 4
D. J. McDonald, MScAgr, PhD

Regional Director of Agriculture and Fisheries, Region 5
D. E. Toohey, HDA, Grad Dip Extension

PLANT INDUSTRIES

HORTICULTURE

CITRUS

Sweet oranges, particularly Valencia and navel, now make up 88 per cent of NSW plantings. Although processing continues to be the main market, demand and prices were depressed until world prices for frozen orange juice concentrate increased significantly towards the end of the season. The recommendations of the Industries Assistance Commission Inquiry into Fresh Fruit and Fruit Products, if adopted, will also have an important effect on the growing and processing industries by significantly reducing tariff protection and unnecessary sales tax.

Owing to problems with orange juice and fruit quality, a departmental working party was formed in the Murray and Riverina Region. Some areas requiring work were identified by the working party, including total soluble solids:acid ratio, small fruit size and excessive rind blemish. These were further investigated and reviewed at a subsequent Research and Advisory Planning Conference. A number of new programs will now be developed to assist growers with these cultural problems.

EXPORTS

Because of to the uncertainty of processing, increased fresh fruit exports were maintained during the year after dramatic increases in the previous year. These exports came mainly from the Murrumbidgee Irrigation Area and the Murray Valley (Sunraysia) Area. South East Asia, the Pacific and Europe were the main markets. A new market was developed in Europe for export in bulk, Class 2 grade oranges for fresh in-store juicing.

Apart from the regulatory aspects of export, officers were active in improving fruit quality, handling, postharvest treatments and storage to ensure good market out-turns.

A trial consignment of oranges cold-sterilised against Queensland fruit fly (*Dacus tryoni*) for Japan, which has banned ethylene dibromide fumigation from this season, was very successful and out-turned in good condition. Future exports to Japan from 1988 will be cold-sterilised against this pest.

Research was completed at the Horticultural Postharvest Laboratory, Gosford, on

Washing oranges is the first step on the long road to export.

Unless disease-tested buds from superior clones are used to establish new citrus plantings, the quality and quantity of fruit produced will be poor.

cold-disinfestation trials for lemons. Further trials will begin on mandarins, limes and grapefruit in an attempt to meet strict Japanese quarantine requirements.

The detection of Fuller's rose weevil (*Asynonychus cervinus*) in Japan has now created additional problems. New trials were begun to control the weevil in the field and to keep the egg-laying adults off trees. Postharvest research was also conducted to control eggs on the fruit. In particular, hot water dipping showed promise and could be incorporated into a normal packing line.

These programs and current advisory programs on 'Preparing Produce for Export Markets' and 'Improving Citrus Fruit Quality' will ensure improved fruit quality and market out-turns.

CROP PROTECTION

At the Biological and Chemical Research Institute, Rydalmere, the Plant Pathology Branch regularly used biological and biochemical indexing to screen the Department's budwood blocks for virus infections. During the year over 1700 citrus trees were screened for viroids. Eight viroids were identified by newer biochemical means including citrus exocortis, citrus variable, hop stunt and citrus cachexia (xyloporosis). Work is continuing to characterise the viroids, relate to them to the symptoms and free the stocks of virus-like diseases by shoot tip grafting.

CROP IMPROVEMENT

Long-term horticultural evaluation, virus indexing and screening of new rootstocks continued as major research programs. This research permits the supply of superior budwood and seed to industry from the Department's multiplication scheme, which is supplied through the NSW Horticultural Propagation Cooperative Society Limited. Less budwood was again supplied during the year (397 486 buds), due mainly to further reduced demand for Valencia oranges (because of the current processing situation) and, to a lesser extent, navels. Seed supply was maintained at 260 kg.

Navel clones. Industry interest is being shown in new 'summer navels' that mature later than the currently available varieties, and which have recently been found in the Sunraysia and Riverland regions. The most promising clones have now been collected by the Department for virus indexing and will be included in planned evaluation projects with other clones from the multiplication programs or imported from Spain and California.

Rapid multiplication. The nursery industry agreed to adopt a new rapid interim budwood multiplication scheme proposed by the Department. A large number of new citrus varieties and clones will soon become available from plant quarantine, shoot tip grafting and local selection. This material has been indexed for virus diseases but is only available in very limited quantities. Because of the long period required for normal evaluation and multiplication, the new scheme will ensure that nurserymen and growers have access to the best material available in the shortest possible time.

Rootstock screening. NSW is currently screening over 140 new rootstocks and has a major role in the cooperative national rootstock screening program.

Initially all new rootstocks are screened at BCRI for resistance to root and collar rots caused by *Phytophthora citrophthora*. A rapid and reliable test has now begun using an aerated nutrient solution inoculated with the fungus.

REDUCING PESTICIDE USE

The successfully developed biological control program against the very important citrus pest red scale (*Aonidiella aurantii*) continues. Pesticide use has declined from the application of several broad-spectrum chemicals a year to the release of parastic wasps (*Aphytis melinis*) and the more environmentally acceptable petroleum oil.

Greenhouse thrips (*Heliothrips haemorrhoidalis*) caused serious blemishing on coastal fruit. Two parasitoids were introduced; one, *Geotheana parvipennis*, has now been reared at BCRI. If it is successfully released, repeated pesticide sprays may become unnecessary to control this thrips.

A similar project also began at the Agricultural Institute, Yanco, to develop an integrated control system for the new pest of inland areas caused by the spined citrus bug (*Biprorulus bibex*).

The need for superior fruit quality requires detailed attention to crop management in this citrus orchard.

ORNAMENTAL CROPS

The value of nursery production in NSW in 1987 was $106 million. Registrations of nurserymen under the Horticultural Stock and Nurseries Act increased slightly to 3700. The number of resellers dropped slightly to 3000. Almost $79,000 from the HSN Act fund was distributed for approved research projects.

Overproduction of easy-to-grow plants, particularly those used indoors, continues. Many nurseries are in financial difficulties.

The rate of increase in the number of flower growers has slowed but there is still overproduction of basic lines such as carnations and chrysanthemums. Advisory services are providing information to growers on the culture of new crops.

CROP IMPROVEMENT

At the Horticultural Research and Advisory Station, Gosford, research continues on crops with the potential to become major cutflower or flowering potted plant exports. Techniques for the micropropagation and cutting propagation of Geraldton wax (*Chamaelaucium uncinatum*) have been developed. Several new *Lechenaultia* hybrids have been bred and trialled for use in pots and baskets. Techniques for their micropropagation have been established.

The development of Australian rainforest plants suitable for indoor use is concentrating on techniques for rapid propagation with tissue culture. Indoor plants make up almost 25 per cent of the total value of sales of nursery produce in NSW. There is a big demand for unusual species both here and overseas.

Arrangements have been made for the commercial development and subsequent marketing of six species or cultivars suitable for sale as potted ornamental plants for either foliage or flower display.

PROTECTION SERVICES

Work at Gosford concentrated on the control of twospotted mite (*Tetranychus urticae*) which is causing nurserymen and cutflower growers increasing difficulty. The problems of rose growers have received special attention.

Emphasis was placed on the development of suitable integrated control programs using the predatory mite *Phytoseiulus persimilis*. This is a cooperative project with Hawkesbury Agricultural College. In the short term growers were advised on suitable pesticide choice and methods of application.

The disease chrysanthemum white rust, first found in Australia in 1986, is now firmly established in chrysanthemum growing areas. Growers were given detailed advice on the correct choice of fungicides and suitable sequences and application techniques.

POSTHARVEST SERVICES

Optimum time for harvest and improved postharvest handling methods are being investigated for an increasing number of species. Two seminars on postharvest handling were conducted for growers and florists.

GARDEN ADVISORY SERVICE

The Garden Advisory Service answered 21 000 telephone, personal and mail inquiries principally from home gardeners but also from schools, councils, nurseries, landscapers and others.

The service was again represented on a panel of experts giving advice to the public during the Royal Botanic Gardens' annual 'Spring in the Gardens' display and took part in Carnivale in Parramatta Park.

Officers answered questions from the public at the Royal Easter Show and at Agview 88 this year.

POME FRUITS

DEVELOPMENT OF NASHI INDUSTRY

The Department assisted the developing nashi (Asian pear) industry by multiplying and distributing propagation material of six new varieties and two rootstocks. Introduced earlier by the Department from Japan and Korea, these new varieties were released from quarantine only this year. Following evaluation for performance under NSW conditions it is anticipated they will provide a useful complement to the small number of varieties already being grown commercially.

There are now about 165 hectares of nashi planted in this State. The oldest trees are four years old. These produced an initial very light crop this year.

The fruit of nashi is considered to have good prospects on both domestic and export markets.

Australian native plants are an important industry, on both the domestic and export markets.

VARIETY INTRODUCTIONS

It is important for the Australian pome fruit industry to have access to, and keep abreast of, new overseas varietal introductions. This is particularly important when servicing export markets. During the year, 21 new varieties, selections and rootstocks introduced from overseas several years ago were released from quarantine. Amongst these were varieties and selections of apples, European pears and nashi, as well as pear rootstock varieties. Amongst the above material are three patented varieties which will be evaluated by the Department but of which propagation material can be made available only to licensees of the varieties.

Four varieties and selections which have low chill requirements have attracted considerable interest amongst potential growers on the North Coast where it has not been possible to grow good quality apples and pears in the past because of insufficient winter chilling conditions. The Department has arranged to evaluate the new varieties in these areas.

Nashi fruit, a type of pear originating in Asia, is becoming increasingly popular with NSW fruitgrowers.

APPLE NUTRITION AND NEW TECHNOLOGY

Apple trees are now planted much more densely than formerly, a practice which can result in much higher productivity and improved production efficiency. It has, however, focused the need for research into the nutritional requirements of trees grown under the more intensive systems.

The Department has begun monitoring nutrient levels in leaves and fruit from trees subjected to various fertiliser application rates at different planting densities, and to monitor the quality of fruit at harvest and following storage. The investigation will run for at least three years.

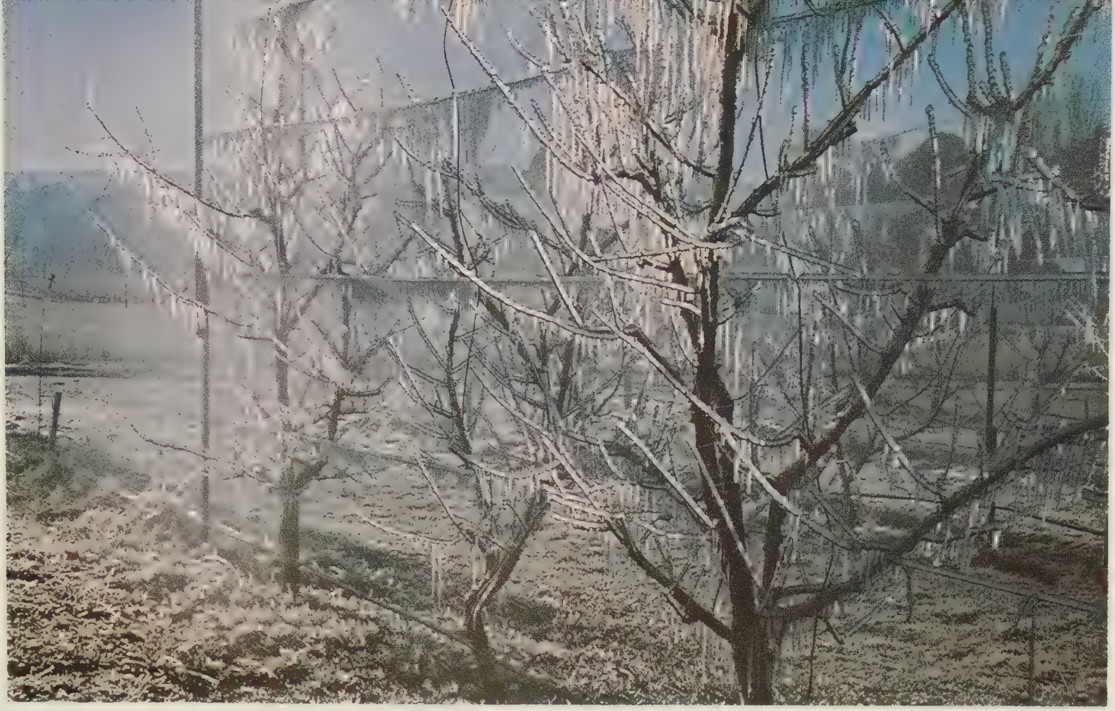
IMPROVED MARKET QUALITY OF APPLES

Successful research reported in 1985–86 to develop objective maturity tests and so prevent the marketing of grossly immature and overmature Jonathan and Delicious apples, has now been accepted by the Commonwealth authorities. The maturity tests based on fruit soluble solids content and flesh firmness have been incorporated into a draft of the Export Control Act schedule for apples, administered by the Department of Primary Industries and Energy. It is anticipated that it will be possible to introduce accompanying legislation in this State before the start of the 1989 apple season.

Research was begun to develop similar maturity tests that will be suitable for Bonza and Granny Smith apples, and Packham's Triumph and Beurré Bosc pears.

CROP IMPROVEMENT

Results obtained during the year confirmed an earlier report of higher production from the first two crops from virus-indexed apple trees compared with those infected with latent viruses. The research showed that the use of propagation material free of known latent virus diseases confers a significant commercial advantage, perhaps as great as 50 per cent in terms of yield. The Department is establishing a multiplication unit in which this high quality propagation material, designated Virus Tested Elite, will be grown for distribution to commercial users as part of the New South Wales Pome Fruits Improvement Scheme.


Bob Wickson

A frost-protection system, developed at the Agricultural Research Station, Bathurst, is being commercialised by the Department.

CROP PROTECTION

Following the withdrawal of DDT from all uses in NSW in 1987, apple growers had to use the only registered substitute, endosulfan, for control of apple dimpling bug in spring 1987. Apple dimpling bug, which attacks during blossoming, is a serious pest in NSW. A survey of 97 orchards at Orange in February 1988 revealed that many growers were dissatisfied with endosulfan. Grower estimates of damage to fruit ranged from 1 to 30 per cent, with a mean of 8 per cent, which is a very significant loss. A trial conducted at Bathurst Agricultural Research Station showed that a new synthetic pyrethroid, fluvalinate, gave control equivalent to DDT. Fluvalinate is safe to bees, but is very toxic to predatory mites. Its use is likely to cause serious disruption of integrated mite control and result in an increased dependence on miticides by growers. This could soon lead to a serious resistance problem and a crisis in mite control.

POSTHARVEST SERVICES

The aim of postharvest research in NSW Agriculture & Fisheries is to solve problems in the storage, handling and marketing of horticultural produce, to develop better technology to maintain fruit and vegetable quality, and to prevent wastage. Much of this work is conducted in cooperation with the CSIRO Division of Horticulture (formerly Food Research), and is funded from national sources.

During 1987–88 a number of postharvest research projects and advisory programs in the export and domestic markets were successfully completed.

Much research and development work has been done in the past five years into postharvest tomato quality. To get the results of this work to the consumer an in-store promotion was held in February 1988 in nine leading shopping centres. The main message delivered was 'Do not store tomatoes in the refrigerator'. Samples of correctly treated tomatoes were handed out as well as pamphlets on the proper handling of tomatoes in the home.

The results of work investigating quality factors in apples were submitted to the Department of Primary Industries and Energy for inclusion in the new export regulations. A simple chemical test is used at the start of the season to determine the level of sugar and acid in the apple. This is related to its subsequent consumer acceptability. A physical test to determine flesh firmness is used at the end of the season. These tests are being prepared for inclusion in the Plant Diseases Act Standards for fruit sold in NSW.

Work examining new maturity tests for kiwifruit was also completed during the year. Two new maturity tests were developed. One involves ripening fruit with ethylene and measuring soluble solids with a refractometer. The other, involving determination of dry matter content, is suitable for use by regulatory agencies. Industry groups are currently considering the tests for incorporation into the export regulations.

Work into fruit fly disinfestation by using low temperature storage resulted in the formulation of suitable handling procedures for oranges. Submissions were forwarded to the Japanese quarantine authorities and the treatment was accepted. This led to the replacement of the ethylene dibromide fumigation by cold treatment for disinfestation.

In 1987–88 training workshops were held for staff involved with the export program. At these workshops AUSTRADE and industry people discussed problems and programs in export development.

Of particular importance are divisional officers working within industry groups on local export development committees. An example of such a committee is the Sunraysia Export Development Committee which has industry representatives and officers of NSW Agriculture & Fisheries and the Victorian Department of Agriculture and Rural Affairs. This concerted effort helped to increase the export of table grapes from NSW by nearly 400 per cent in the three years to 1986–87, and even more by the time the 1987–88 season finished.

A series of databases was set up on the Department's PRIME computer network to assist departmental officers involved in export.

In cooperation with the citrus boards of NSW, Victoria and South Australia, the Department prepared two posters concerned with upgrading the packing quality of citrus. The first poster gives the guidelines for correct orchard management. The second poster gives the guidelines for correct packing shed management for quality fruit. The posters were designed to be placed in all packing sheds and citrus properties throughout Australia.

During 1987–88, three publications were released as the beginning of a new series designed to assist industry to grow and prepare produce for the export market. Much of the postharvest information contained is applicable to the domestic market. The publications can therefore be used as a guide to establishing quality for the home consumer.

STONE, BERRY AND MISCELLANEOUS TEMPERATE FRUITS

Plantings of stone fruit crops continued to expand, particularly dessert peaches, nectarines, cherries and prunes. Plantings of berry and other soft fruits stabilised. The Department's supporting programs in research, advisory and regulatory activities for the industries continued.

EXPORT DEVELOPMENT

One of the Department's major priorities is in the development of export opportunity for horticultural produce. Special efforts have been directed towards the preparation of export guidelines for growers, packing houses and agents contemplating export. Publications were completed for peaches nectarines and sugar plums. Specific information was also published to assist export developments in the newly established low-chill stone fruit industry on the North Coast.

The Principal Horticulturist (Stone and Berry Fruit) visited South East Asia and Japan in February 1988 to monitor the out-turn of sugar plum exports and to make recommendations to the industry for improvements to export marketing strategies. A further aim of the visit was to investigate export opportunities in Taiwan and Japan. There are indications that both of these markets could offer good outlets for sugar plums.

CROP IMPROVEMENT

The Department conducts a major crop improvement program for the stone and berry fruit industries. It is directed specifically towards improving varieties for the domestic and export fresh fruit markets.

Over 40 new varieties of peach, nectarine and plum were released from quarantine for evaluation in various parts of NSW and additional varieties were obtained from other state departments for testing here.

The Department organised the visit to Australia of Professor Wayne Sherman, Fruit Breeder from the University of Florida, whose varieties form the basis of the low-chill stone fruit industry on the North and Central Coast. During his six-month stay Professor Sherman was located at the Tropical Fruit Research Station at Alstonville and from there visited other stone fruit areas of Australia. The exercise will assist Professor Sherman in the development of new fruit types for our growers.

Since his visit Professor Sherman has supplied the Department with an additional 40 stone fruit varieties of special interest to temperate and subtropical areas of the State. These include non-'melting-flesh' peaches which could have special appeal in the South East Asian markets.

The large-scale, stone fruit variety evaluation program at Bathurst Agricultural Research Station, involving a wide range of varieties being tested for local and export markets, attracted over 600 visitors at the Station's annual stone fruit field day.

Coffee—another relatively new industry for the North Coast.

Tea is a new crop for the North Coast of NSW. Success with this crop required the development of suitable harvesting equipment.

One of the most significant initiatives over the past year was the organisation of the National Low Chill Stone Fruit Conference at Lismore attended by over 300 delegates from all states of Australia. Advisory staff played an important role in the organisation of this important conference.

An estimated 1.5 million strawberry runners were produced under the Department's certification scheme. Final testing of lines in the Strawberry Evaluation Program at Gosford was completed and these will be included in the certification scheme when virus tested planting material is available.

The Pest-Check phone-in arrangements implemented for MIA prune and canning fruit growers continue to provide an important service to these industries. During 1987 a prune rust management system was introduced. This uses computers to identify weather conditions favourable to prune rust.

TROPICAL FRUIT

BANANAS

The NSW banana industry maintained its high level of production with the wholesale value of fruit again exceeding $50 million.

Two meetings of the Banana Industry Research and Development Advisory Committee were held during the year to determine research and advisory priorities. Based on the recommendations of this committee, funds were made available from the Banana Industry Committee to supplement departmental resources. The Banana Industry Committee is able to raise funds for research, development, pest and disease control and promotion, through the powers of the Banana Industry Act 1987.

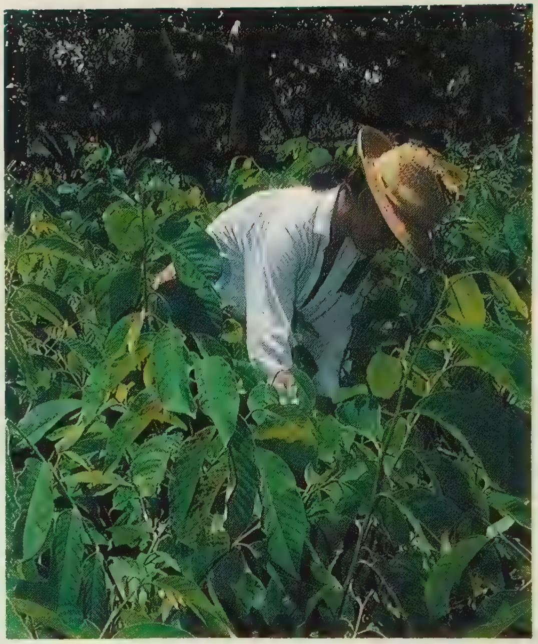
The banana tissue culture trial, examining plant spacing, cover crops and cultivars, continued to provide valuable interim data useful for future industry development.

Although bunch trimming is generally not profitable in the tropics, and Queensland work has indicated no increase in the yield of extra-large fruit or the length of remaining fruit, many NSW growers trim bunches to improve fruit size and quality. At the request of NSW growers, bunch trimming trials were conducted on bunches which emerged in June and July and which normally are very slow to reach maturity. Heavily trimmed bunches produced 50 per cent more marketable, extra-large fruit than untrimmed bunches.

Integrated pest control. Research and advisory programs continued and were aimed at reduced and more strategic use of pesticides. This is particularly important in the control of banana weevil borer and banana red spider. Adequate control of the latter is generally achieved by natural predators if growers do not apply pesticides. Good control of banana weevil borer can be gained by baiting with spent pseudostems and by plantation hygiene. Baiting also monitors weevil borer levels to determine whether pesticide applications are necessary and, if so, the best timing.

AVOCADO

Indexing of fruit tree propagation stocks for the presence of virus disease is a well understood technique. All commercial blocks of avocados producing accredited material were tested for Avocado Sun Blotch viroid in conjunction with the national scheme organised by the avocado industry.



Many tropical fruits are assessed for their potential as industries for the North Coast at the Tropical Fruit Research Station, Alstonville.

MACADAMIAS

With a sharp rise in the price paid by processors for nut-in-shell, macadamias have become a very profitable long-term crop. Expansion continued: over 3700 ha are now grown in NSW. As more orchards start bearing, production will rise sharply, making a significant contribution to export earnings. Some 2300 tonnes of nut-in-shell, worth over $9 million, were produced in NSW this year.

Departmental research and advisory programs are aimed at the use of improved varieties and orchard management to minimise losses of soil and organic matter.

OTHER CROPS

Research and advisory programs continued to emphasise postharvest and marketing strategies of a range of crops including custard apples and lychees.

Investigations into internal fruit quality problems with custard apples concentrated on possible nutrient disorders. However, preliminary investigations have shown severe root injury, which appears to be nematode-induced. It appears that avocados, lychees and macadamias are similarly affected. If further investigations confirm the role of nematodes, this departmental study has major implications for the yield and quality of tropical fruit.

VEGETABLES

VEGETABLE EXPORTS

Rock melons and bulb onions were the most important vegetable crops exported during the year. Melons were exported mainly to South East Asia. The out-turn was variable but departmental trials with film wrapping materials showed that shelf life can be greatly extended.

A 50 per cent increase in the area of bulb onions grown in the Murrumbidgee Irrigation Area (MIA) was a response to the potential for exports to Europe between January and April. Onion out-turn improved this year as growers paid more attention to quality assessment and pre-shipment storage recommendations from the Department's research and extension staff.

A team of departmental officers met with onion growers in the MIA to coordinate production and postharvest schedules designed to provide export quality crops.

Three senior staff visited growers, exporters and government organisations throughout Australia as part of a project to produce a Vegetable Export Review study.

PESTICIDE RESIDUE SURVEY

A wide range of NSW and interstate vegetables were analysed for residues at the Biological and Chemical Research Institute, Rydalmere. The vegetables were randomly sampled at Flemington Markets and from roadside retail outlets. No residues exceeded the prescribed maximum residue limits. This survey was undertaken by the Department in conjunction with the Sydney Market Authority and with the cooperation of all organisations associated with Flemington Markets.

VARIETY EVALUATION

Brussels sprout varieties were evaluated at the Horticultural Research and Advisory Station, Gosford, as part of a study to determine the suitability of this crop for production in Central Coast districts. Sequential and 'once over' harvesting were compared. Results indicated that some varieties produce acceptable crops from a single harvest.

A range of Asian vegetables was grown in screening trials at Gosford in response to continuing increased interest in these vegetables for domestic and export outlets. Chinese cabbage, Japanese radish and turnip, bunching onion and Chinese broccoli performed particularly well and will be trialled and demonstrated on commercial properties during 1988–89.

POTATOES

The area for production of certified seed remained static with Sebago again occupying 80 per cent of seed production. Processing companies are particularly interested in the cultivar Atlantic, which was brought into the certified seed scheme during the year. Commercial crops grown from seed from the Department's pathogen-tested scheme will be planted in 1988. Growers are keen to evaluate the new material in a variety of field conditions.

Aerial spraying of onions.

The administration of the seed certification scheme was the subject of a number of meetings between Department of Agriculture officers, seed potato growers, commercial potato producers and processors. Seed potato growers showed some interest in taking an increased responsibility for the scheme in the near future.

The production of healthy propagation material requires detection techniques that give a high probability that the material is free of disease. All the Department's microtuber propagation stocks were tested for virus infection by ELISA (enzyme-linked immunosorbent assay), and inspected for fungal or bacterial infection.

A revised powdery scab proclamation was gazetted in 1988. The new proclamation specifies shires which are free from powdery scab disease and outlines measures for maintaining those shires as desirable certified seed producing areas.

Tomatoes

The area of processing tomatoes grown with trickle-irrigation continued to increase. Some crops were grown with buried trickle-irrigation systems. Research continued into cropping systems for the production of processing tomatoes with high total soluble solids. A new research horticulturist was appointed to the Horticultural Research and Advisory Station, Griffith, to develop this work on tomatoes and melons.

Preparations began for the release of a fresh market tomato cultivar bred by the Department's vegetable plant breeder. The new cultivar—HARU 83-131—has been bred as a replacement for 'Flora-Dade' in coastal production environments. Research station and commercial trials consistently demonstrated that the new cultivar has root-knot nematode resistance, medium to large fruit size and excellent fruit quality.

Mushrooms

Following the visit and recommendations of Dr R. Barton, a mushroom virologist from the Institute for Horticultural Research, Littlehampton, UK, the Australian Mushroom Growers' Association introduced a scheme for routine virus screening of farms and mushroom spawn.

Hydroponics

The number of NSW soilless production units exceeded 80 with more than 30 per cent between Grafton and the Queensland border. Lettuce, strawberries and cut flowers are the most important crops. An industry association, the Northern Rivers Hydroponic Association, was formed with the assistance of departmental officers. Construction began on a unit for hydroponic lettuce research at the Tropical Fruit Research Station, Alstonville.

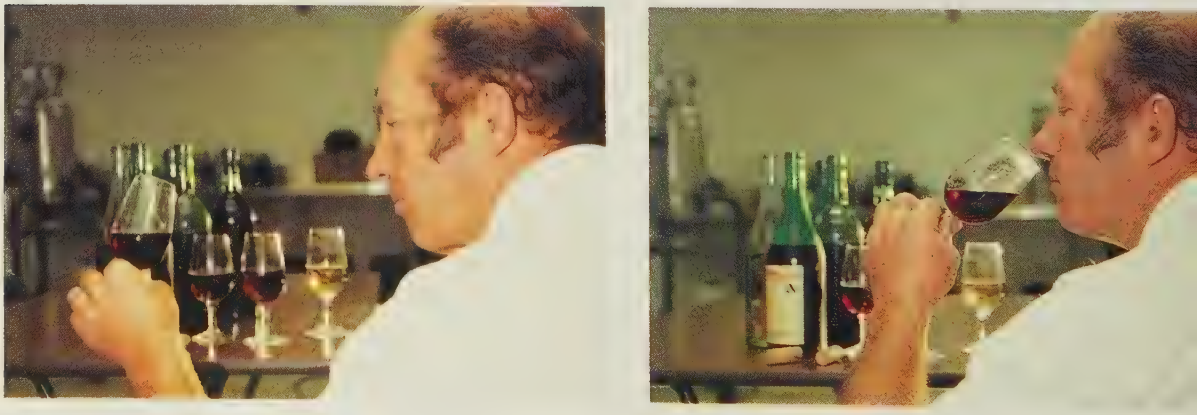
Viticulture

Crop Improvement

The MIA Vine Improvement Society (MIAVIS) sold 1 330 000 grapevine cuttings in its fourth successful year of operation. Of these, 940 000 were from varieties for which the NSW Horticultural Propagation Cooperative Society Ltd is the approved source under the Horticultural Stock and Nurseries Act, and for whom MIAVIS acts as an agent.

The Sunraysia (NSW) Vine Improvement Society again helped to supply approved source cuttings through the Victorian and Murray Valley Vine Improvement Association, of which it is a corporate member. Another group, the Coastal and Hunter Vine Improvement Society, was formed, thus completing the network of vine improvement bodies through the State. With statewide coverage it was possible then to form a statewide coordinating body, the NSW Vine Improvement Society, which met for the first time in Griffith during January 1988.

Modern, small-scale, winemaking facilities are a feature of the Horticultural Research and Advisory Station, Griffith. The ultimate value of any new variety or selection of winegrape or the effect of any cultural treatment in the research program can best be determined by the quality of the wine that is subsequently made. Here the end result is being assessed.



MAXIMISATION OF VINEYARD YIELDS

In a trial to maximise grape production at Griffith, in which vines were trained to a range of canopy densities, yields of more than 100 t/ha were achieved on a number of vines in the second year of cropping. The vines were in a planting of the wine variety Colombard. These high yields were achieved by a pre-plant gypsum and ripping soil treatment; use of Ramsey rootstock; regular undervine irrigation and fertilisation; herbicide weed control; training the vines on an overhead trellis; and pruning to hanging canes.

The most productive trial vine produced at a rate of 107 t/ha. The high yields retarded ripening and lowered sugar levels compared with fruit from the normally pruned vines in the planting.

IRRIGATION

With a weekly supply of irrigation water made available for the 1987–88 irrigation season, Coomealla grape growers were encouraged to adopt irrigation scheduling based on the 'Water Watch' system. This has lead to greater irrigation efficiency and better vineyard management. In other districts such as Mudgee and the Hunter Valley, improved irrigation management was developed through programs involving neutron probes, better irrigation equipment and fertilisation.

DEAD ARM DISEASE

In a trial at Dareton to establish optimum irrigation frequency and rate of water application for own-rooted and grafted sultana vines, definite responses to the different irrigation treatments were recorded. Best yields in own-rooted vines continued to be from the moderate-volume weekly or fortnightly treatments. Vines on Ramsey rootstock showed a progressive decline in yield with increased rates of water application. This was attributed to increased shoot growth over fruit production and will necessitate a change in the pruning method for correction.

In an effort to find a replacement for the conventional treatment sodium arsenite, which can only be applied before budburst to control dead arm disease, a trial began at Griffith in 1986–87 comparing several fungicides as spring treatments. Except for the one systemic chemical used, the alternative fungicides which are already registered for other uses in grapevines all reduced stem infection, leaf infection and leaf fall. These effective fungicides are especially important in giving wide flexibility to the MIA vine spray program and in controlling dead arm disease now identified in Hunter Valley vineyards.

CROWN GALL DISEASE

Crown gall disease was found in two Griffith vineyards which had obtained grafted vines from a South Australian nurseyman. Dr Tom Burr, a plant pathologist from the Geneva Experiment Station, New York, spent six months at the Waite Institute in South Australia investigating the disease. He visited Dareton, Griffith and the Hunter Valley and confirmed that American rootstocks in South Australia are heavily contaminated with a strain of crown gall (biovar 3) specific to grapevines.

Dr Burr has developed a method of treatment using hot water. He also developed indexing procedures which should overcome the problems of identifying the disease which is often carried without symptom development.

TEMPERATE NUTS

Considerable interest has been shown in NSW in nut growing and there is evidence that some of the suitable nut types will develop into small but significant industries. These include almonds, pistachios and chestnuts. Pecans are already a significant crop. Four departmental officers visited north-eastern Victoria and the Dandenongs to update their knowledge of the industry, particularly with regard to walnuts and chestnuts.

FIELD CROPS AND PASTURES

An understanding of the soil is important in understanding how crops grow.

AGRICULTURAL ENGINEERING BRANCH

FARM EQUIPMENT INDUSTRY ASSISTANCE

The Director of Agricultural Engineering represented NSW on a national committee to monitor developments and field evaluations of ground tools with different steel compositions and heat treatments. Although these experiments are still continuing, they have already indicated some steels which are superior to those used in imported ground tools.

Agricultural Engineering Branch assisted local manufacturers by providing technical advice on the design of and improvements to tractors, including slashers, seeding equipment, offset discs, chisel ploughs, laser levelling equipment, prickle chain harrows, a pneumatic fertiliser applicator and light crop harvesting attachments.

These direct involvements were complemented by field testing of equipment, and by the actions of two Branch members on the NSW Agricultural Equipment Advisory Committee. This Committee helps to resolve differences between farmers and industry, where complex problems and machinery complaints have arisen. Twenty-two formal cases came before the Committee this year and numerous other complaints were resolved informally using the Committee's complaint resolution system.

FINANCIAL PROBLEMS AND FARM EQUIPMENT ADVICE

Engineering Branch staff conducted further tractor programs and field days to reduce fuel and operating costs by modified driving procedures, correct tyre ballasting, tyre selection and implement matching. Data collected in preparation for these tractor field days using local farmers' machinery was incorporated into two computer databases which were developed to improve the efficiency of tractor usage.

A series of 'Farm Mechanomics' workshops was launched in the north west of the State by farm mechanisation advisers to educate farmers and commercial interests on machinery selection, financing and equipment management. In the south, tillage systems that use less energy and that minimise soil damage involved mechanisation advisers in programs to convert tillage equipment to improve trashflow and to encourage the adoption of rolling prickle chain harrows. A demonstration unit was built in the Agricultural Engineering Centre Workshop for use behind chisels or scarifiers to help break down clods, level the surface and control weeds. Its excellent trash handling, self-cleaning ability and relatively low cost have encouraged local manufacture and a steady rate of adoption of the system.

CONDOBOLIN TILLAGE RESEARCH

The tillage engineering research unit at Condobolin was involved in chisel plough and crop establishment experiments this year, with field experiments on four soil types.

Many of the chisel plough jump systems were found to have insufficient breakout force for the soil conditions. This leads to rapid tip wear on the ground-tools, can affect penetration, and certainly affects the uniformity of performance of the tines from front to rear of the implement, with adverse effects on weed control and on air-seeding performance when used with chisel ploughs.

Crop establishment trials were conducted with ten different seeder and ground tool configurations, with and without presswheels. Non-uniform depth of cover to seed emerged as a major problem, which is alleviated by the use of presswheels. The other feature which emerged from the trials was the general relationship between draft, penetration resistance and soil disturbance, but not necessarily seed emergence. Those tines which would enable the furrow to be closed best with presswheels tended to promote the best emergence. The difference in depth to seed between front-ranking and rear-ranking tines would affect wheat varieties with short coleoptiles, especially if a pre-emergence herbicide were used. Techniques to reduce this ranking effect were recommended.

MB trac 1500

Many farmers have more money invested in their machinery than in their land.

Engineering Databases

Extensive computer databases on Tillage, on Tractor Operating Performance (TOPS) and on Farm Equipment Supplies (FITS) were completed. These are now on-line for use by regional Engineering staff and are being considered for commercial adoption.

Reduced Pesticide Residues

As part of a Department-wide program to reduce pesticide overuse and abuse, all agricultural mechanisation advisory officers directed their efforts into three specific areas—broadacre spraying, orchard spraying and grain insect control—to ensure correct pesticide application rates.

Field days were conducted throughout the State to show the correct operation, maintenance, adjustment and calibration of boom sprayers. A new and more readily portable 'patternator', which detects uneven spray nozzle discharge patterns, was designed to show the effects of nozzle position in relation to the spray target.

Meetings and field days were held to give orchardists instruction in converting dilute spraying machines to low volume sprayers and in calibrating low-volume spraying. The conversion information given was based on the findings of the Orchard Spray Application Work Group in trials conducted in the Orange and Bathurst areas over the last five years. The meetings and field days generated inquiries from the other states for assistance and information.

Advisory officers conducted a campaign to encourage the use of sealed grain silos to control insects more efficiently than is currently possible, using fumigation rather than conventional insecticides. Sealed silo demonstrations at major machinery field days throughout the State stressed the particular advantage of fumigation, which is reduced pesticide residues.

FARM SAFETY

Several Engineering Branch staff were involved as specialists advising on farm safety extension programs, dealing with safe farming near power lines, electric fence energisers (to generate an SAA standard), safe tractor operation, risks with dangerous gases and entrapment in stored or flowing grain.

CONSERVATION FARMING

The Department is committed to protecting and improving the rural environment and to preventing the degradation of the State's natural land and water resources. To highlight the importance that the Department attaches to this issue, its Strategic Plan nominates Land Use and the Environment as one of six major areas of focus that are its priorities for the next 3 to 5 years. Conservation Farming is a key program run jointly by the Department and the Soil Conservation Service.

ADVISORY

The seven regional conservation farming coordination committees, supported by research and advisory officers, continue to encourage farmers to adopt conservation farming practices. This aspect of the program hinges on two main types of activity: the demonstration of conservation farming methods and practices using landholders' properties, and the promotion of the adoption of conservation farming principles through field days, meetings, show days and media coverage.

A large number of demonstrations formed the focus of some 210 field days. Other activities included:

- 40 trials or investigations
- 80 meetings
- 10 major displays or exhibitions
- 10 in-service workshops and courses
- the Bicentennial Conservation Farmer of the Year competition
- the production of numerous press releases, radio and television broadcasts, information sheets and newsletters.

The booklet *Farm Development in the Southern Tablelands and Monaro* was sold out within six weeks of publishing.

Reports from the regional committees indicated the steadily increasing incorporation by farmers of conservation tillage principles and practices into the management of their whole farms. Examples include the rapid adoption of direct drill, mulch sowing and reduced tillage for pasture establishment on the North Coast; widespread acceptance of reduced tillage for sorghum in the North West; increased adoption of cover cropping in Hunter Valley vineyards; and buoyant sales of specialised seeders for direct drilling pastures in the South West.

There have also been separate but complementary activities in the component programs of acid soils, salinity and trees on farms.

Acid soils advisory activities focused on the judicious use of lime. Numerous lime trials and demonstrations continued. Ten field days, ten meetings and two workshops were held. The *Acid Soils Advisory Newsletter* was initiated to disseminate information and to coordinate advisory activities.

Recognition of acid soil problems by farmers continued to increase, with corresponding growth in the use of lime, particularly for pastures and horticulture on the North Coast and pastures and field crops in the South West.

The increasing salinity of the State's land and water is a major problem. To counter it, the State Government launched STOP SALT, a statewide strategy to control salinity as part of its Total Catchment Management program. STOP SALT is a joint program of NSW Agriculture & Fisheries, the Soil Conservation Service, the Department of Water Resources and the Department of Lands.

This important new initiative aims to manage soil and water salinity levels to ensure their sustainable use, to improve productivity and to maintain environmental quality. The program was designed to operate at state, regional, local and individual levels, with STOP SALT groups forming action plans at each level. STOP SALT will complement the Murray-Darling Basin Ministerial Council's Salinity and Drainage Strategy.

As well as their involvement in STOP SALT, the Department's salinity advisory officers have been very active in the field, mainly in the Murray and Murrumbidgee Valleys. This has included participation in three field days, a Tullakool Advisory Group seminar on salinity and shallow watertables, and seven meetings of the Drainage Sub-Committees of the Murray Research and Extension Committee and the Irrigation Research and Extension Committee.

Continuous agricultural production has resulted in many NSW soils becoming acid. The Department has devised treatments to reverse this.

Farmers are becoming increasingly aware of the value of strategically located farm trees. This is reflected in the high demand for information on farm planning and tree establishment throughout NSW.

Ten field days and seven seminars were conducted, the former to demonstrate successful tree establishment techniques, the latter to emphasise proper farm planning. Trees on Farms awareness displays were staged at four field days and various country shows, and a series of radio tapes called *Tree Lines* was produced for statewide distribution. A television community service announcement promoting the Trees on Farms program in the north of the State resulted in 170 inquiries in the week following broadcast.

A series of Farm Trees brochures, produced by the Department, the Soil Conservation Service and the Forestry Commission, was initiated. Fifteen thousand copies of the first in the series, *Why you need trees on your farm*, were distributed.

A position of Farmer Tree Group Development Officer, jointly funded by the Department, the National Tree Program and the NSW Farmers' Association, was established. The main duties of the officer are to assist the development of new and existing Farmer Tree Groups and to promote community awareness of the importance of trees on farms.

RESEARCH

Conservation tillage research has continued throughout the State, with emphasis on direct drilling on the North Coast, nil or reduced tillage in the North West, reduced cultivation and direct drilling in the Central West and direct drilling in southern NSW.

The practicability and profitability of no-till sorghum in the North West has been demonstrated by departmental research staff, and adoption by farmers has been rapid. Investigation of different sowing techniques for direct-drilled wheat in the Central West showed the benefits of using winged points on dry, hardsetting red soils. A new project aimed at improving stubble management at harvest began in the South West.

The acid soils research program is based at Wagga Wagga. It aims to improve the prediction of plant responses to lime, to develop less acidifying agricultural production systems, and to breed species and varieties of plants that can better tolerate acid soils.

Lime rate experiments using pasture and crop species began in the Central and Southern Tablelands and South West slopes to study plant responses to lime. An updated map of the pH of surface soils of NSW was completed. Cocksfoot and lucerne pastures were shown to be more effective than annual pastures in preventing nitrate leaching, one factor known to cause soil acidity. Plant breeding programs for acid tolerance in wheat and barley continued.

Research on salinity at Deniliquin concentrated on field methods for quantifying soil salinity, leaching rates and salt tolerance of field crops and pastures. A rapid field technique for measuring soil salinity in the rootzone was used to monitor shallow watertable areas to determine optimum management for salinity control. It was shown that salt tolerance mechanisms in barley break down under waterlogged conditions.

Factors affecting the efficiency of flood irrigation were investigated using a water balance technique. Very low infiltration rates were obtained in the presence of shallow watertables.

The Department acquired 110 ha of land in the Berriquin Irrigation District to establish a permanent site for irrigation management and salinity research. The site, known as the Murray Valley Field Station, is 8 km north of Deniliquin in a shallow watertable area. Research and advisory projects to be conducted at the Station will be concentrate on hydrology, agronomy, economics and technology transfer under salinised conditions and will cover a wide range of field crops and pastures.

Research into the direct seeding of native trees and shrubs also continued at Tarago and Manilla. A trial of soil preparation techniques was sown at Wagga Wagga. Other research projects involving studies of residual herbicides, electronic fencing and tree nutrition began.

EDUCATION

A work group consisting of officers from the Department and the Soil Conservation Service and secondary school teachers was formed to prepare a package of resource material on conservation farming principles for use in Agriculture and Geography courses in North Coast secondary schools.

A package of salinity information was sent to all NSW state secondary schools for Australian Science in Schools Week. Four talks on salinity were given to various community groups.

Information kits were distributed on request to state secondary schools for use in the Trees on Farms unit of the senior Agriculture course. Departmental staff again participated in residential short courses and home study courses on farm trees, presented by the Murrumbidgee College of Agriculture.

FIBRES AND OILS

COTTON

The 143 000 ha cotton crop in NSW, which produced about 900 000 bales in 1987–88, is the biggest on record, with yields slightly above the long-term average. Above-average midsummer rainfall alleviated an acute shortage of irrigation water in the Gwydir valley as well as ensuring a record yield in the 10 000 ha dryland crop. Very wet weather in April, just as picking was about to begin, downgraded lint quality as well as leaving the saturated soils very susceptible to severe structural damage from heavy harvesting machines.

The heliothis caterpillar is the biggest single enemy of cotton.

A continuation of the strong research and extension effort by the Department has helped maintain the effectiveness of the insect resistance management strategy for *Heliothis*. Monitoring by departmental entomologists revealed a halving of pyrethroid resistance levels in *H. armigera* in 1987–88 after a continuous increase over the previous three years. A major factor in the lowered resistance was the successful extension of the finding that some cultivation of cotton stubble is essential to prevent the survival of over-wintering *Heliothis* pupae in the soil, significantly reducing the number of resistant moths emerging in spring. Lower *Heliothis* pressure and reduced pyrethroid use were also factors.

Pathologists succeeded in reducing the level of seed-transmitted bacterial blight to about 1 per cent in 1987–88 planting seed of the variety Deltapine 90. This compares with levels of

5 to 20 percent in seed for the 1985–86 season. This reduction was an important factor in reducing infection levels in crops of this variety.

Research at Narrabri showed that cotton can be grown successfully using minimum tillage. This technique can halve the cost of seedbed preparation by greatly reducing the number of passes over the soil, without any loss of yield or change to fertiliser requirements. As well as a major cost saving, minimum tillage can minimise compaction and soil structural damage when seedbed preparation has to be carried out on wet soil, thus maintaining its productive capacity.

The period of waterlogging which usually occurs in a cotton crop after each flood irrigation commonly reduces yield. Losses are greater in crops with lower plant nitrogen levels. Recent research at Narrabri showed that a small amount of nitrogen applied just before an irrigation can minimise these losses. Current research is determinimg the plant nitrogen level below which applications will be economic. This work is likely to lead to higher average cotton yields.

A major study of ways to ameliorate the effects of structural degradation and compaction of irrigated grey soils in the Macquarie Valley was completed. The results were actively disseminated, particularly to cotton growers. Irrigators are being encouraged to use soil pits to identify structural degradation in the soil profile, and are being advised on remedial action where degradation is found.

SOYBEAN

The soybean area declined in 1987–88 in response to improved returns from cotton and rice. The major reduction in plantings occurred in the northern inland irrigated areas where cotton is grown. To a lesser extent there was a reduction in the Murrumbidgee Valley where rice is grown. These reductions were partly offset by increased plantings of raingrown crops in the Inverell area and on the North Coast. Production of about 40 000 tonnes is expected from a 24 000 ha crop, with a farm gate value of about $14 million.

Nautilus, the first Australian-bred, manganese-tolerant soybean variety, was released from the Grafton program during the year. It is adapted to the coastal environment and is a suitable replacement for mid-season varieties such as Bragg. Further selections, with tolerance to manganese and apparent improvements in tolerance to weathering when ripe, are undergoing advanced testing.

Research at Grafton perfected the technique of aerially sowing pasture and forage crop seeds into maturing soybean crops. This method of pasture establishment has proved commercially successful and is now widely accepted. It has the advantages of providing early winter feed without any risk of soil erosion.

District agronomists and crop specialists mounted a major extension program to further improve irrigated soybean profitability in central and southern NSW.

Testing of a crop checking system known as 'Soycheck' began in the Macquarie, Murrumbidgee and Murray Valleys. Crops were monitored at key growth stages throughout the season to assist growers to make sound management decisions. Careful timing of irrigation application is critical to high soybean yields. Growers in the Macquarie and Murrumbidgee Valleys were encouraged to use the 'Water Watch' method of irrigation scheduling and have obtained higher yields as a result. Neutron moisture probes are used to calibrate and fine tune the system on different soil types.

Scientists at Yanco and Glen Innes continued their evaluation of new herbicides for broadleaf weed control in soybeans. They identified herbicides which widen the spectrum of broadleaf weeds that can be controlled. Problem weeds for which no satisfactory herbicides were previously registered are Bathurst burr and black-berry nightshade.

Crop monitoring by entomologists identified grass blue butterfly larvae (*Zizina labradus*) as a major pest of soybeans in central and southern NSW. Brown bean bug (*Melanacanthus scutellaris*) also emerged as a significant pest. It is particularly hard to detect in crops. Monitoring and control strategies which were developed for both pests are resulting in higher average yields.

SUNFLOWER

Lower oilseed prices led to a smaller sunflower crop in 1987–88 than in previous years. The crop is expected to produce 68 000 t from 53 000 ha, down from 86 000 t from 82 000 ha in 1986–87. District agronomists continued to evaluate commercial and experimental hybrids at sites throughout the North West, where about 90 per cent of the crop is grown.

Trial results again demonstrated the superiority of full-season hybrids which yield up to 40 per cent more grain than short season types, even in lower-yielding situations. Growers are being encouraged to control ground-dwelling insect pests with an in-furrow insecticide spray treatment at planting. The treatment is resulting in much better crop establishment in areas where these insects are known to occur.

RAPESEED

The 1987–88 rapeseed crop produced about 47 000 t from about 37 000 ha, down slightly on the previous year. This is due largely to lower oilseed prices and increased profitability of winter grain legumes.

Average rapeseed yields increased substantially in recent years from 0.8 t/ha or less in the early 1980s to 1.1 t/ha in each of the last four seasons. This increase is due partly to more favourable seasons and more grower experience with the crop but is due also to the research and extension efforts of the Department. Growers have been encouraged to grow the higher yielding *Brassica napus* varieties, to improve their crop establishment and nutrition practices, and to manage insects pests better. Continuation of this work, along with the release of superior varieties, will see further rises in the profitability of rapeseed growing.

Two new high-yielding varieties, Maluka and Shiralee, were registered. The varieties, from the Department's breeding program at Wagga Wagga, are likely to be grown widely in all Australian states in 1988–89, largely because of their 20 per cent yield superiority over the varieties they will replace.

A series of nitrogen trials demonstrated that on low-fertility sites rapeseed yields were increased by an average of 25 per cent using 50 kg/ha of nitrogen. The yield responses, all of which where economic, depended on the rate of nitrogen applied rather than on application timing. These findings support those from similar work with wheat which indicated that improved nutrition can significantly improve the profitability of winter cropping. This work is the basis for a major extension campaign to improve crop nutrition.

Red legged earth mite and blue oat mite are major causes of poor rapeseed establishment in central and southern NSW. Present registered insecticide use-patterns provide very little residual protection for crops; rapid re-infestation of sprayed crops occurs. Increased application rates of methidathion and chlorpyrifos were authorised to allow growers to protect their crops while more detailed studies are undertaken. A detailed study of mite ecology was begun at Yanco to provide a better understanding of the pest and to try to forecast mite plagues. Departmental entomologists, in conjunction with Bayer Australia Ltd, are reviewing rates and application methods of existing and new insecticides to determine ways of achieving better residual protection of emerging crops.

District agronomists and crop specialists evaluated a crop checking system known as 'Rapecheck' to help growers make sound management decisions at key growth stages, with a view to increasing the profitability of the crop. The system is being developed in conjunction with several farmer groups.

LINSEED

Linseed continues to be a small crop in NSW. Plantings in recent years have averaged about 3000 ha, with average yields of about 0.8 t/ha. Australian production does not satisfy domestic demand for this industrial oil. The Department's crop specialists are taking a new look at linseed with a view to increasing production of industrial oil and preparing the way for the anticipated release of edible-quality linseed from CSIRO in about 3 years. An Argentine variety, Areco, was evaluated as a replacement for the current variety Glenelg in high-yielding sites and under irrigation, where it yields better and is more resistant to lodging.

SAFFLOWER

Safflower is an opportunity crop in NSW with an average annual production of 6000 to 10 000 t in recent years. It is grown mainly on the North Western Plains and in dry lake beds in the far west of the State. It has also proved to be a useful rotation crop with cotton and other irrigated crops, where it is used to dry out saturated subsoils to promote deep cracking and structural improvement. The Department's major activity with this crop in 1987–88 was to promote the commercial adoption of the new CSIRO-bred varieties Sironaria and Sirothora and to encourage improved crop management to increase the profitability of the crop. Sironaria, the variety for which most seed was available, has been well accepted and is likely to become the major variety in NSW and Queensland.

KENAF

A yield of 11.45 t/ha of dry stem was achieved from a trial plot of kenaf at Leeton. This is a satisfactory yield considering the crop was planted 4 to 6 weeks later than desirable. The Department is cooperating with a private company which is examining the feasibility of kenaf production in the MIA. The crop is used for paper manufacture.

TEA TREE OIL

Some 35 tonnes of tea tree oil were produced in 1987–88. Most of it was harvested from natural stands of tea tree (*Melaleuca alternifolia*). This is about double the production of the previous year. The area of tea tree grown in plantations has now reached about 350 ha, most of which is not yet in production but will come into production during the next 12 months. Research at Wollongbar indicates that improvements in distillation methods may produce up to 20 per cent better oil recovery from the leaves, but it is not yet known if this can be achieved commercially.

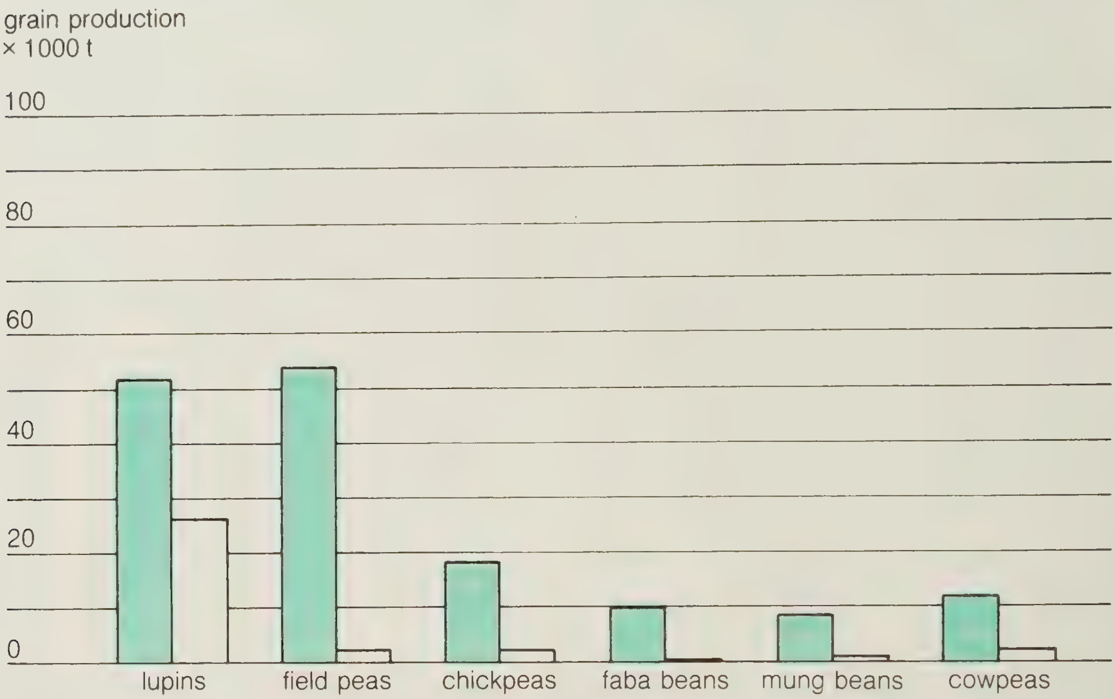
GRAIN PRODUCTION

The area sown to grain crops in 1987–88 continued to be adjusted in response to depressed international markets and competition for resources from a buoyant wool industry. The latter stimulated increased plantings of oats and barley; these, together with growing interest in pulse crops, held the total area sown to grain crops relatively stable.

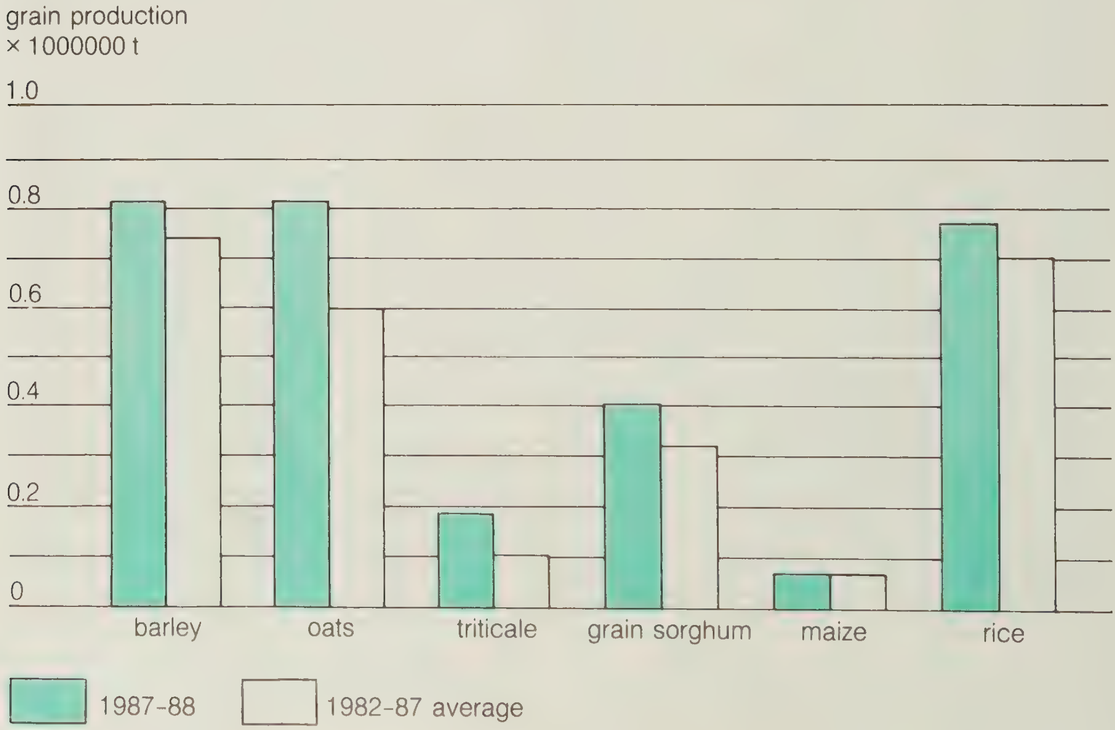
During the period under review, the grain industries were placed under considerable scrutiny, notably by the Industries Assistance Commission and the Royal Commission into Grain Handling, Storage and Transport. The Department presented substantial submissions to both enquiries covering a wide range of administrative, logistical, marketing, agronomic and entomological issues. The recent introduction of stockfeed permit sales and direct grower-to-buyer arrangements for the domestic wheat market diverted about 25 per cent of wheat away from the central handling system.

Rice is a major cereal crop in the Murrumbidgee and Murray Valleys.

Crop production—pulses



Crop production—cereals



A number of difficulties were encountered in marketing increasing quantities of pulses. Field peas in particular proved popular in southern rotations but trading on the export market was fragmented and lacked market intelligence. The Department moved to establish links with growers, agents and Austrade and conducted a number of seminars to help alleviate this situation.

There was considerable interest in the area of processing crop material, both grain and residues. Attention turned to the potential use of part of the 4 million tonnes of wheat straw for the manufacture of paper and hardboard. The Department provided data on straw yields in all cereal districts and advice on the assembly and transport of compressed straw.

There was a marked upturn in human consumption of oats with rapidly expanding sales of muesli in both packet and compressed bar forms, following media debate on the benefits of betaglucans in oats. Preliminary investigations also studied the potential for rice hull ash, which produces a very pure silica, for use in microprocessor components.

PRODUCTION

The 1987 winter season was severe in a number of central and northern districts with an extremely dry finish accompanied by widespread frosts. While this reduced wheat yields, there was virtually no weather damage to grain and over half the crop was of a quality above that of Australian Standard White. Total wheat production was estimated at 4 million t from a planting of 2.3 million ha. The area sown was down dramatically on the 4 million ha of 1983–84. The planted areas and production of the major winter-growing cereal crops are summarised in the bar charts.

The opening of the 1988 winter season was excellent in central and northern districts with the best prospects in the North West and upper Central West for many years. By the end of May the Southern Slopes and eastern Riverina, the last severely drought-affected areas, received relief. Early estimates for the new wheat crop were for a planting of 2.7 million ha, an increase of 400 000 ha on the previous season.

CROP IMPROVEMENT

The long drought of 1980 to 1983, low grain prices and rising costs forced many graingrowers to adopt exploitive crop production systems. Shortened clover ley rotations and drastically reduced applications of fertiliser resulted in a further protein decline in cereal grains.

The Department, through field days, publications and on-farm advice, strongly promoted the virtues of improved rotational planning and management.The strategic use of pastures and grain legume crops for nitrogen enhancementof soils, improved weed control, reduction of soil-borne diseases and better fallowing techniques for soil moisture conservation were stressed as fundamental to the sustained production of high-yielding quality produce.

'Operation Quality Wheat', to counter declining wheat protein levels, was developed as a cooperative program between the Department, the Queensland Department of Primary Industries, the Australian Wheat Board and major fertiliser companies. Working parties were established in Queensland and in northern and southern NSW. The program drew together all available research, technical, economic and marketing information on which to base crop management strategies for increased production of high-quality grain. It will be evaluated on a selection of growers in 1988 and industry-wide in 1989.

The rapid and extensive diversification within the cropping industries placed heavy demands on research and advisory resources. The new pulse crops in particular required that both Australian and overseas cultivars be evaluated, cultural requirements be identified and extended and large gaps in the weed and pest control spectrum be closed. A number of permits were sought and granted for the use of grass herbicides on lupins, field peas and chickpeas.

Plant breeding efforts continued to expand the range of varieties of winter cereals and pulses. Owlet, the first rust-resistant winter wheat available to farmers for many years, was released from the Department's Temora program. Other new cereal varieties included the spring wheat Dollarbird, the excellent quality durum wheat Yallaroi, dual purpose oat Hakea and winter barley Ulandra. Three new chickpea varieties and one new lentil variety were submitted by the Department for registration and release.

The Department's role in liaison with the grain industries was consolidated during the period under review. While there had been long-established arrangements for liaison with the wheat industry, strong formal links with other grain industries were extended through

NSW Agriculture & Fisheries conducts both research and advisory programs to improve the efficiency of water usage in many crops.

The neutron probe accurately measures the amount of water used by this soybean crop and allows accurate forecasting of irrigation needs.

the Barley Industry Liaison Committee, Oat Industry Advisory Committee, Triticale Association and Grain Legume Association. In addition, a support group of departmental officers was formed to streamline and coordinate the oat research and advisory programs. This acted as a model for future expansion into the other grains.

In the rice industry, 140 growers participated in a pilot project to develop a system for predicting nitrogen requirements of rice. The system was based on near-infrared reflectance measurements from plant tissue and was available 24 hours a day to growers. This service will in future be integrated with the Rice Check program, a management aid developed by district and research agronomists working with 50 farmer discussion groups in all rice districts.

The release in 1987 of the semi-dwarf, medium-grain rice varieties Amaroo and Bogan brought to 60 per cent the area sown to departmentally developed varieties, the highest proportion yet.

A major project during 1987–88 was the design and implementation of a wheat variety database to record and analyse, in great detail, the results of statewide trials. The program will permit the evaluation of varieties on a wide range of criteria including response to rainfall, adaptation to acid soils, reaction to disease, grain quality parameters and field and harvest characteristics. The Grain Production Section also computerised the crop forecasting service and began the task of expanding varietal databases to encompass oats and barley.

District agronomists responded to the increasing demand for their services by encouraging group activities to extend new cropping technology. The publication of a wide range of technical support material, including the latest varietal recommendations, weed and insect control and regional cropping budgets, enabled them to divert energies to new areas of investigation.

IRRIGATION MANAGEMENT SERVICE

EXTENT OF PRODUCTION

The estimated value of irrigated production in NSW is about $800 million annually from about 820 000 ha of land. This represents about 20 per cent of the value of all agricultural production on less than 2 per cent of the State's agricultural land. Irrigation is therefore an intensive user of land which demands that inputs be carefully managed to obtain a profitable result and to avoid unintended consequences such as land salinisation.

About two thirds of irrigation water used in NSW is used in the irrigation areas and districts of the Murray and Murrumbidgee Valleys. This area is also responsible for about half the value of irrigated production in the State.

FARM WATER SUPPLIES LOANS

The Department recommends to the State Bank on the technical desirability of loans for irrigation works.

This year the Treasury specified to the State Bank that only $2.3 million of works could be approved and $1.7 million could be made in payments. Approvals and payments actually made by the State Bank were very close to these figures.

This year applications for loans on works valued at $3.5 million were examined for the Bank. About half of the applications for funds were in the Murray and Riverina Region.

WATERFORCE

Waterforce is a major project conducted jointly by the Irrigation Association of Australia and NSW Agriculture & Fisheries. Its prime purpose is to improve water use efficiency in all irrigation situations.

During 1987–88 the Department formulated an advisory program and sought to implement the findings of the Waterforce report (see *Annual Report 1986–87*) in the

Macquarie Valley on a trial basis. The program will seek to document the rate of adoption of improved irrigation practices and to promote specific, improved, cost- and water-use-effective irrigation practices. In April 1988 an experienced district agronomist was seconded full-time to this program for six months.

The Irrigation Association of Australia sought sponsorship from the Department of Primary Industries and Energy and from industry for the appointment of a coordinator to establish similar programs in other states using the NSW experience as a model.

The Department of Water Resources joined the Waterforce working committee.

ESTIMATING CROP WATER USE

The Department continued to develop its system of crop water estimation and irrigation scheduling programs. Crop water use information, under the title 'Water Watch' was provided at centres in major irrigation areas. The effect of irrigation scheduling is most evident where other improved irrigation practices have been adopted, including improved surface drainage, landforming, bed farming and use of soil ameliorants.

ADOPTION OF IMPROVED IRRIGATION PRACTICES

Effective and profitable irrigation requires that many farm operations be conducted at the right time and well. This systems approach to farming requires a high level of management in many aspects of the farm business.

Preliminary information was collected during the year about the rate of adoption of improved farm practices. It became apparent that the adoption of technology may be patchy and piecemeal, both between farms and even between enterprises on individual farms. This would considerably reduce the benefits from the capital already invested in improved technology.

Consequently the Department began planning for a statewide survey of adoption of improved irrigation practices. This is a major task that will require extensive effort to bring to fruition. However, planning of technically relevant future research and advisory programs will require this type of information together with objective knowledge of irrigation farmers' attitudes to adopting technology.

COMPUTER-AIDED SURVEYING AND DRAFTING

The Department obtained and developed the capability for computer-aided drafting to support its irrigation design services available from the Dubbo office.

PASTURES

ADVISORY

Pasture species. Variety trials, conducted by research and advisory staff, were established throughout the State. The objective is to ensure that the most appropriate pasture varieties for particular enterprises are used by all land owners by 1990. Lucerne, subterranean clover, serradella, perennial grasses, wet-area legumes, perennial ryegrasses and grasses for semiarid-zone regions were tested in 89 experiments. The results of the trials form the basis for pasture recommendations which will ensure pasture stability, environment conservation and economically efficient agricultural enterprises. This is an important part of the Department's strategic plan for land use and the environment.

Pasture quality. Teams comprising agronomists and livestock officers began a program to define relationships between pasture quality and animal production. These will be used in a range of decision-support computer programs that will be used in the dairy, sheep and cattle industries.

Fertilisers. As part of the Department's strategic plans on land use, farm business management and computer technology, a program was begun to facilitate extension processes so that by 1990 most primary producers in NSW will be able to make decisions about fertiliser application according to the criteria for maximum efficiency.

The AGPLAN computer program was further refined for commercialisation and use by advisory staff. This program identifies the most efficient fertiliser rate for a specific enterprise. Use of the program will improve recommendations to develop sustainable agricultural systems.

Studies of pasture composition in semi-arid grazing areas are necessary to determine appropriate grazing and land management practices.

Scientific research by NSW Agriculture & Fisheries' agronomists is necessary in the continuing effort to develop new and improved crop types.

Pasture establishment. To ensure viable business management of agricultural enterprises, inputs must be applied with maximum efficiency. It has been shown that 60 per cent of sown pasture seed fails to establish because of poor early management practice. An advisory program was begun to encourage farmers to use the correct seedbed preparation, sowing rates, varieties, fertiliser, timing, inoculation, sowing techniques and grazing management.

Irrigated pasture management. At a training workshop held at the Yanco Agricultural Institute, advisory staff learned up-to-date irrigation management technology and strategies to tackle the problems of poor irrigation layout, bad design and salinity. This enabled the formation of multidisciplinary advisory teams to develop advisory strategies irrigated pasture in specific irrigation areas.

An advisory support system called SUBCHECK was initiated in the Finley district. In a pilot program, 30 irrigation farmers are recording seeding rates, date of pasture sowing, pasture yield, stocking rate, grazing days and wool, meat and milk production. All inputs of fertiliser, irrigation water, insecticide and herbicide were recorded. The critical management factors that are identified will be used in advisory programs that will improve irrigated pasture management.

RESEARCH

Thirty research agronomists devoted at least part of their programs to pastures in 1987–88.

Crop improvement. The appointment of a full-time lucerne breeder at the Agricultural Institute, Yanco, enabled the breeding program to resume. The program aims to develop a winter-active lucerne cultivar with multiple resistance to root and crown rot, leaf diseases and aphids. The lucerne breeder will also take over the program to develop a lucerne cultivar with aphid resistance which will suit continuous stocking management in low rainfed environments.

Recommendations for the coordination of a national lucerne breeding and evaluation program, made at a planning meeting at Yanco in December 1986, were implemented. The breeding programs of NSW and South Australia cooperated by exchanging plant material that could be tested under the specialised procedures peculiar to each. Officers of the Department began developing a cooperative cultivar evaluation procedure and a standardised description of disease and pest resistance. This will be used nationally.

The NSW Herbage Plant Liaison Committee recommended that the two new cultivars of serradella, GS046.1 and GM065.2, be registered and released for use by farmers. Thus pasture legumes are now available for the acid sandy soils of Central West NSW, where all other legumes have failed in recent years.

A national white clover improvement program began. This will select white clover lines with increased persistence and stability. The value of this work for NSW is estimated at $70 million a year. Glen Innes Agricultural Research and Advisory Station was selected as the primary site for the screening of a large collection of Australian and overseas lines of white clover.

Other aspects of the white clover program were:

- the characterisation of the collection by recording plant morphology, phasic development, seed and seedling characteristics, survival, reaction to disease and pests, nutritive value and seasonal growth pattern in detail
- development of a computerised database incorporating both details of origin and performance data from field trials and incorporating appropriate information from the database maintained at the National Genetic Resources Centre for Temperate Forage Legumes (*Trifolium*) in Perth
- development of satellite testing sites in NSW, Victoria and Tasmania.

The problem of establishing sound pasture recommendations that will ensure the stability of the environment in the cropping zone at the fringe of the semiarid areas of western NSW is being overcome with successful cultivar evaluation and pasture establishment research being conducted at Walgett. Aerial seeding to coincide with rainfall is an innovative program in such areas, having enormous potential for establishing pastures quickly.

A team at the Agricultural Research Centre, Tamworth, developed LATIS (Lucerne Agronomy and Technology Information System), a computerised lucerne management advisory package which will be used by advisory agronomists in servicing lucerne growers. This program is the forerunner of a series of similar decision support systems which will be developed by the Department to support NSW farmers. At the 1988 Royal Easter Show, LATIS won first prize in the production section of the rural software competition and was awarded the ICL Special Award for Excellence.

REMOTE SENSING

NSW Agriculture & Fisheries continued to extend and refine the operational uses of satellite data to improve the management of regional resources. Increasing interest in the technology within the Department required more emphasis on providing information on the capabilities of remote sensing and educating staff in its use in their daily operations. In response to this need the Remote Sensing Section arranged short courses, prepared briefing papers on specific topics for distribution through the *Remote Sensing Newsletter* and advised staff on facilities and processes suitable to their needs. In addition, the need to achieve maximum cost effectiveness encouraged greater collaboration between agencies in the collection of information. The

Accuracy of mapping rice areas by satellite on four occasions in three seasons

Area	Season	Satellite used	Accuracy of mapping	Errors of omission	Errors of commission
Yanco IA	83–84	Landsat	94.0%	6.0%	2.0%
MIA	84–85	Landsat	95.2%	4.8%	1.2%
Yanco IA	86–87	Landsat	96.9%	3.1%	0.4%
Yanco IA	86–87	SPOT	99.1%	0.9%	0.4%

Accuracy of mapping cropping in the Balranald and Condobolin Shires of the Western Division of NSW using Landsat data as part of the Western Division Monitor

Area	Season	Accuracy of mapping crop areas	Errors of omission	Errors of commission
Balranald	1986	94.8%	5.2%	3.3%
	1987	93.6%	6.4%	0.0%
Condobolin	1986	94.7%	5.3%	5.6%
	1987	100.0%	0.0%	0.0%

concept of collaboratively collecting regional information, initiated by NSW Agriculture & Fisheries, was unanimously adopted by the NSW Remote Sensing Committee.

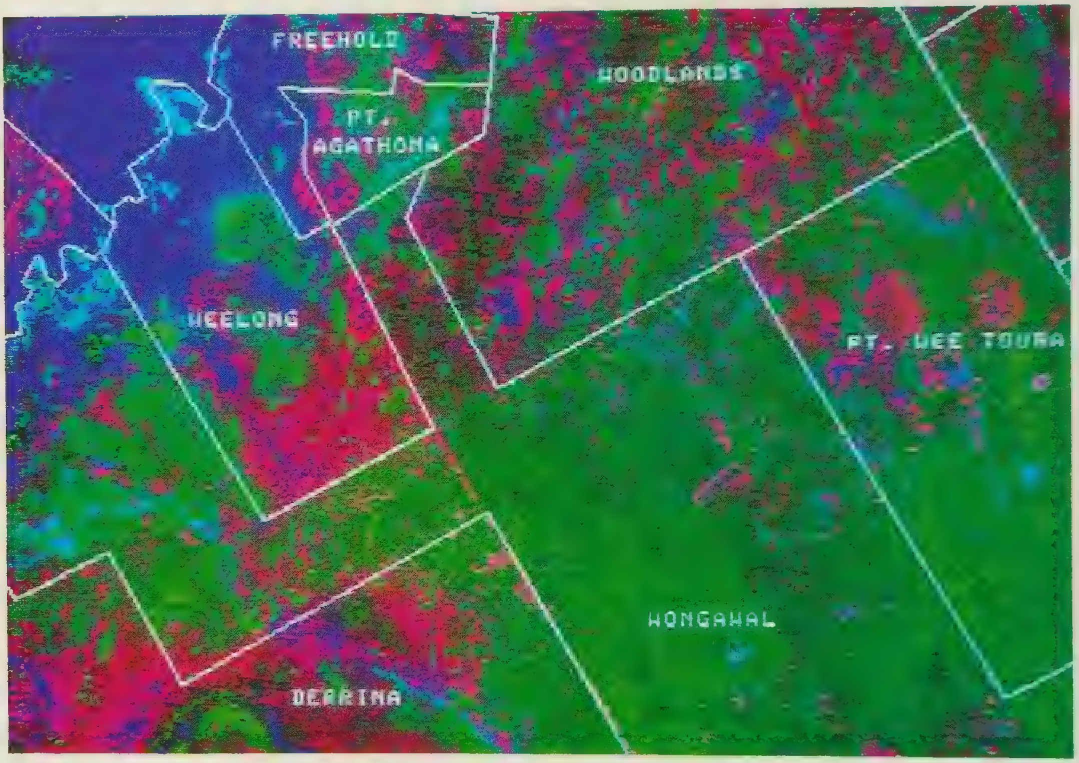
ADVISORY

Landsat satellite images continued to be used to prepare 1:100 000 scale agricultural classification maps over extensive areas of the Western Slopes and Plains of NSW. Production of these maps saved the Department about $30,000 for the year compared with the cost of producing them by conventional aerial photography. Greater consistency can also be achieved between maps because fewer image interpreters are involved.

RESEARCH

The eight research and development projects in the Remote Sensing Section proceeded satisfactorily during the year, with three reaching successful conclusions.

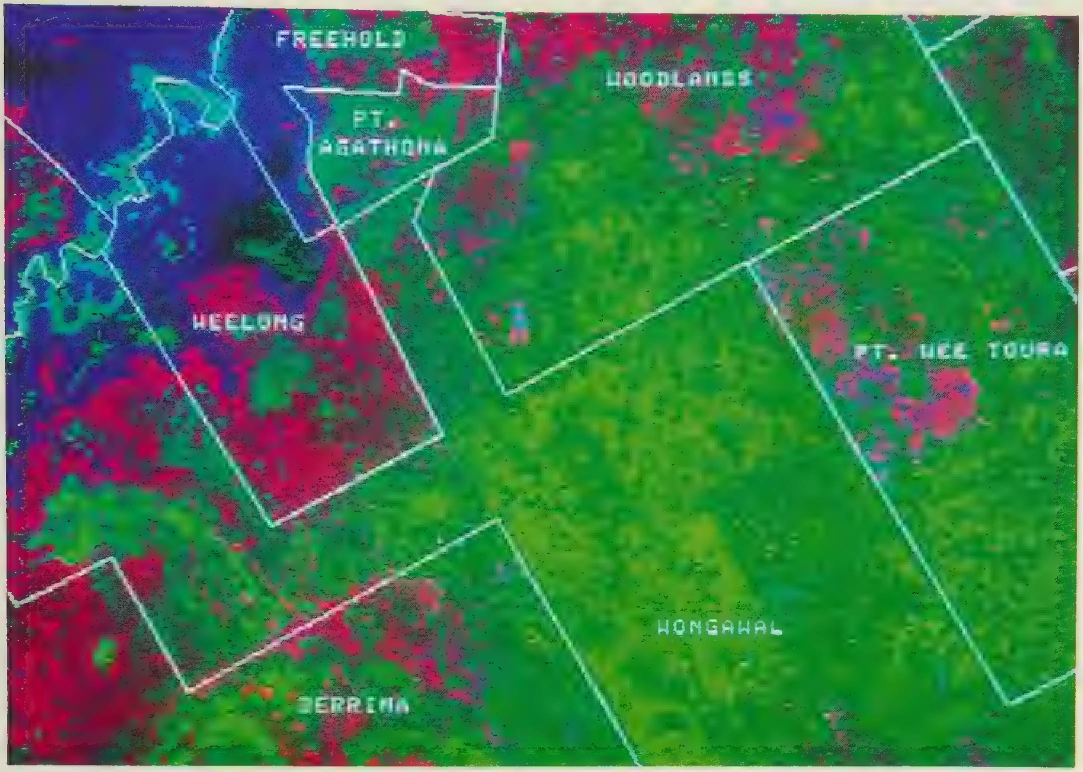
- The evaluation of 20 m resolution French satellite (SPOT) data in comparison with 80 m resolution Landsat satellite data demonstrated a high level of accuracy and consistency in monitoring rice crops in southern NSW (see first table). Adoption of this technology to monitor the rice crop would cost more than $50,000 a year in comparison with the conventional aerial photographic method in current use.
- A program to monitor cropping and clearing in the Western Division of NSW was implemented successfully in 1986–87 (see second table). A program management group was formed to review these results and recommended a course of action. This management group, consisting of NSW Agriculture & Fisheries, the Western Lands Commission and the NSW Farmers' Association with observers from six other departments and instrumentalities, recommended conversion of the project to an operational program for implementation in three shires in 1988. This program is one of the first operational monitoring programs in the world. It confirms NSW pre-eminence in using this technology for the management of regional resources.
- Winter cereal cropping around Nyngan and Walgett was successfully mapped by visual analysis of Landsat images covering three years (1985 to 1987). This showed that the technique is both accurate and reliable. The technique will continue to be used in the Nyngan and Walgett districts to accumulate a cropping history database for use as a diagnostic and planning tool by the district agronomists. It will be extended to other extensive cropping areas of the State in the future.



Karen Hall

- The development of a program to map tree canopy cover was successfully completed and evaluated in the Gilgandra and Louth areas. Comparison of the mapping with aerial photography showed that Landsat satellite data can estimate the percentage of woody vegetation canopy cover with an accuracy of ± 7%. These studies clearly demonstrated the dramatic changes in shrub cover that are occurring in some parts of the western rangelands of NSW. The photographs shown here depict the density of woody vegetation in 1975 and 1987 respectively as shades of green. Analysis of these results revealed increases of up to 24 per cent in the area of some properties covered by woody weeds over the period. The technique will be further refined and adapted to support programs designed to reduce or eliminate shrub invasion.

Remote sensing using satellite photographs provides land managers with a new tool. These photographs of the Louth area in 1975 (left) and 1987 show woody vegetation as green, bare soil as red and infrared reflectance as blue; property boundaries are in white. Changes in shrub cover between 1975 and 1987 are indicated by differences in green intensity between the photographs. In three properties analysed the density of woody vegetation has increased between 3 and 24 per cent over the period.



Collaboration

The Department is represented on the recently established NSW Remote Sensing Council and the NSW Remote Sensing Committee. The Department provides the Chairman for the Committee. This structure was established to improve the administration of remote sensing in NSW. A major focus of the committee is on the development of collaborative projects to maximise the value of information extracted from the data. At present there are three established collaborative projects: monitoring cropping and clearing in the Western Division, monitoring coastal resources and monitoring landcover in the Murray-Darling basin.

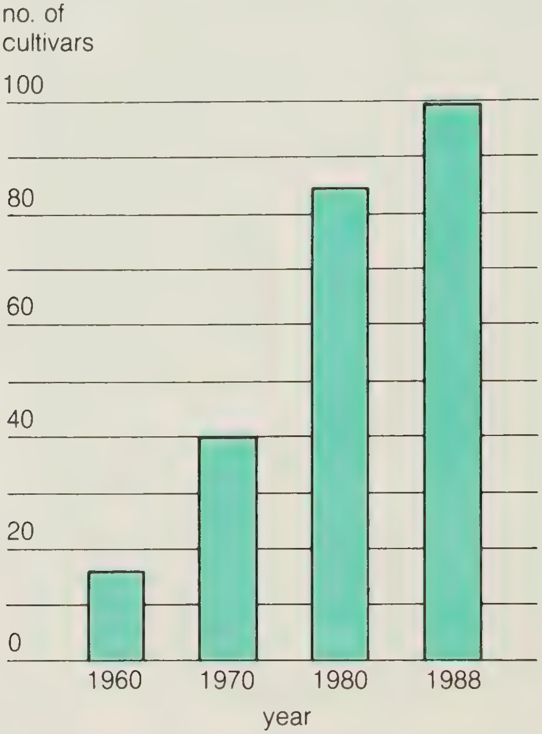
Seeds

From offices at Albury, Coffs Harbour, Cowra, Dubbo, Forbes, Inverell, Sydney, Temora and Wagga Wagga, 12 agronomists and seed production officers conduct the Department's certified and registered seed schemes, promote seed production and administer the Seeds Act. They are assisted from time to time by district agronomists, field assistants and agricultural inspectors. One agronomist conducts seed production research at Trangie. In the seeds laboratory at head office, 11 seed analysts conduct the tests required for certification, seed identification and the laboratory inspections associated with export, import, quarantine and police work.

Seed Certification

Certifying seed is the main activity of the Seeds Section. This involves pre-sowing paddock inspections, supplying basic seed to the grower, giving advice on isolation requirements and agronomy, crop inspections, sampling and testing. The Seeds Section also prints labels certifying that the seed is the cultivar stated on the label and that the contents have the high purity, germination and freedom from other seeds stated on the label.

Number of cultivars in certified and registered seed schemes 1960–1988



Demand for grain legume seed to be certified free of certain seed-borne diseases rose during the year. Crops are inspected for these diseases and are refused certification if the disease is evident above a prescribed level. This year for the first time lupin seed was tested for Cucumber Mosaic Virus and the symptom-free seed labelled accordingly. This was done by growing samples of all lines submitted for certification in the field, out of season, and examining them for symptoms. This was a time-consuming process that lengthened the certification process. The Plant Pathology group at the Biological and Chemical Research Institute assisted in the disease assessment and began devising laboratory tests for some bacterial and viral seed-borne diseases. If the technology is successful, and industry considers it sufficiently worthwhile to bear the additional costs, seed of some species could then be examined for disease level while the other Seeds Laboratory tests are proceeding and certified accordingly.

During the year three new rapeseed cultivars, one ryegrass, a serradella, a lupin, a lentil, a murex medic and several cereals were added to the list of varieties eligible for departmental certification.

There has been a steady increase in the number of cultivars certified in NSW. A total of 7796 tonnes of seed, consisting of 99 cultivars of 28 species, were certified or registered in the year ending May 1988.

DIAGNOSTIC SERVICES

This was the first year since the Seeds Laboratory stopped providing seed tests on request from farmers and seed firms. Private laboratories now meet that need. The Department's laboratory now restricts its services to those tests required for certification, samples collected by agricultural inspectors under the Seeds Act, the Stock Foods and Medicines Act and quarantine legislation, and export and police samples. As the table shows, the laboratory nevertheless tested 500 more samples this year, with less staff than last year.

The Seeds Laboratory trained analysts from commercial laboratories to improve their capacity to offer the services discontinued by the Department in May 1987.

Three analysts continued their studies, with excellent results, in the external course in seed testing offered by the Queensland Agricultural College for the Australian Seeds Committee.

The Department's laboratory joined all other state and territory government seed testing laboratories and one private laboratory in a comparative testing program under which each laboratory sends the others identical samples of difficult-to-test seed lines, and then compares the results. The Australian Seeds Committee coordinated the comparison to promote consistency between laboratories and to identify any deficiencies that might exist among them.

The Agricultural Research and Advisory Station, Temora, took on the responsibility for the distribution of basic seed of winter grain legumes to certified seed growers. It also conducts the Registered Cereal Seed Scheme and administers the production of registered cereal seed by commercial seed growers.

ADVISORY SERVICES

Staff continued their advisory services through departmental publications, field days, Agview, farmer meetings, the rural press and farm visits. The seed analysts attended field days and meetings to demonstrate seed testing technology.

Certified seed production 1987–88

Species	No. of cultivars	Tonnes
Chickpea	2	1101.2
Cocksfoot	2	49.0
Cowpea	1	89.5
Faba bean	1	80.2
Fescue	1	41.7
Field pea	5	635.4
Hybrid maize	2	151.2
Kikuyu	2	11.9
Lentils	1	5.0
Lucerne	10	254.4
Lupin	4	775.6
Mung bean	3	130.8
Perennial ryegrass	1	127.5
Phalaris	4	25.0
Rapeseed	4	294.7
Red clover	1	5.6
Ryegrass	1	17.0
Safflower	2	115.1
Setaria	1	1.8
Soybean	3	28.8
Subclover	7	487.2
White clover	1	100.8
Yellow serradella	1	0.2
TOTAL	60	4529.6

Registered seed production 1987–88

Species	No. of varieties	Tonnes
Barley	6	498.2
Oats	11	945.6
Rye	2	36.9
Triticale	3	137.4
Wheat	17	1648.5
TOTAL	39	3266.6

Seed testing 1986–87 and 1987–88

Source	1986–87	1987–88
Certified and registered	1072	1212
Export and import	922	968
Regulatory	34	356
Police	254	291
Commercial	1240	289
Departmental	740	1632
TOTAL	4262	4748

RESEARCH

Seed staff helped establish herbicide recommendations in ryegrass and medic seed crops. Blanket recommendations for medic species proved to be impossible as large differences in tolerance to herbicides between cultivars of the same species were identified. This resulted in the unusual situation of different herbicide recommendations for different cultivars of the same species.

Seed production research with medics showed how crucial it is to limit grazing in the first year to a light winter grazing in early-sown crops and none at all in late-sown crops. Grazing must cease as soon as flowering starts to obtain a worthwhile seed yield.

The effect of growth regulators and the amount and timing of nitrogen on seed yield of phalaris was examined. Growth regulators made harvest easier by reducing plant height (reducing lodging) and resulted in the seed heads being located in a narrower zone leading to less trash accompanying the seed into the header. The nitrogen work was inconclusive.

COMMERCIALISATION

The Department sought expressions of interest from firms for the exclusive overseas marketing rights for five new cultivars bred by Departmental agronomists. These are two rapeseeds, two durum wheats and one lucerne. At year's end negotiations on royalties and marketing details were continuing with selected companies. Those receiving the rights will be the Department's licencees in those overseas countries with plant variety protection laws.

In return for a small levy the Department arranged the release of a new barley variety bred by the Waite Institute in South Australia without the protection of the new Plant Variety Rights law which would have been available to it from January, 1989. This arrangement made the variety available a year ahead of schedule, and avoided the liability for royalties for 20 years as allowed under PVR law.

WEEDS

ADVISORY

Displays. Live and static displays of noxious plants, urban and agricultural weeds, aquatic pest plants and prohibited prickly pear were carried out in many locations during the year. The most notable were displays at Agview and the Mudgee and Tocal Small Farms Field Days.

Eighth Australian Weeds Conference. Research and advisory staff from the Department played a major role in this conference held in Sydney. Over 250 participants attended and presented papers on a wide range of topics concerning weeds. The Department also assisted by sponsoring one of the overseas speakers whose paper on mycoherbicides was a highlight of the Conference. Delegates went on a field trip to the Elizabeth Macarthur Agricultural Institute to inspect woody weed control trials, and see some of the historic features there.

Agronomists and horticulturists can have weeds identified at the herbarium at the Agricultural and Veterinary Research and Advisory Centre, Orange.

Spraying weeds in a young corn planting.

Fourth Biennial Noxious Plants Conference. This conference was organised by the Department at Hawkesbury Agricultural College. The Biennial Conferences, although organised primarily for local government officers, are important opportunities for all those with an interest in noxious plants and their control to keep up to date on the latest technology and control strategies. As well as Noxious Plant Inspectors employed by local government, there was a wide ranging representation from government departments, spraying contractors and chemical companies from throughout NSW.

Parthenium weed (Parthenium hysterophorus). Since it began in 1983, the Parthenium Weed Awareness and Control Program has proven to be very effective in containing parthenium weed in NSW. The weed has been successfully confined to within the original areas of infestation in the north west of the State. The key to the successful level of containment is through border inspections of harvesting equipment, solidly supported by inspections and treatments by local government weed officers. Over the past 12 months no major infestations were reported although scattered plants were found along roadsides.

Control strategies are currently being broadened to include the biocontrol agent *Epiblema strenuana*, a gall moth, which has become established on noogoora burr (*Xanthium pungens*) in the area.

Dodders. Several outbreaks of dodder (*Cuscuta* spp.) occurred in the State during the past year. Of particular concern were three properties near Hay that sowed lucerne for hay production. The lucerne hay from two of the properties is being exported to Japan and other Asian markets which have a zero tolerance for dodder.

There are two species of dodder present, field or golden dodder (*C. campestris*) and Chilean dodder (*C. suaveolens*).

Parramatta grass (Sporobolus africanus). Parramatta grass continues to spread rapidly on the North Coast. It is now a declared noxious plant in all local government council areas from Nambucca Shire north (except Maclean Shire). Major advisory programs alerted landholders to the problem, but present control measures are very costly or ineffective. The continued spread of Parramatta grass on the North Coast would severely disadvantage the grazing industries there, especially beef and dairying.

Serrated tussock (Nassella trichotoma). A survey showed that, between 1975 and 1985, the total area infested with serrated tussock in NSW declined by 29 per cent or 202 000 ha. Reduction in area of dense, moderate and light infestations was 35 per cent, 58 per cent and 19 per cent respectively. Of the 32 shires with serrated tussock in 1985 only one recorded a substantial increase in area in the preceding 10 years. The most widely used methods of control were spraying with the herbicide Frenock ®, ploughing and sowing improved pastures.

RESEARCH

Improved weed control in aerially sown rice. This project sought to find an alternative to the phenoxy herbicide MCPA, the only one currently available for the control of dirty dora (*Cyperus difformis*) and starfruit (*Damasonium minus*) in rice. The sulfonyl urea and bensulfuron-methyl herbicides gave superior results in all experiments conducted. These treatments gave a higher level of weed control, allowed greater flexibility in timing of application and caused less setback to the crop than MCPA. As a result of this research, it is expected that the rice industry will benefit from a significant improvement in weed control.

New weed problem in rice. The newly introduced water plantain (*Alisma lanceolatum*) is continuing to spread in aerially sown rice. Although only small areas are currently infested, it is regarded as a potentially major weed threat. It is not controlled by any currently available herbicide. Water plantain appears to be an aggressive competitor in the rice crop. Its biology is under research in an attempt to identify where the life cycle may be interrupted by herbicides or other cropping or cultural practices to enable its control.

Woody perennials. In trials to control a range of woody weeds several herbicides showed promise and will be registered shortly. Weeds controlled included sifton bush (*Cassinia arcuata*), Bitou bush (*Chrysanthemoides monilifera*), blackberry (*Rubus fruticosus* agg.), lantana (*Lantana camara*), Australian blackthorn (*Bursaria spinosa*), sweet briar (*Rosa rubiginosa*), African boxthorn (*Lycium ferocissimum*), African olive (*Olea africanus*) and problem eucalypt species.

Goats to control Scotch and Illyrian thistles (Onopordum acanthium, O. illyricum). Feral goats grazed flowering plants of Scotch thistle at Boorowa in midsummer and non-flowering plants in late summer. They reduced ground cover of thistles from 24 per cent to 5 per cent, height from 1 m to 1 cm and seed production from 16 million/ha to nil. Sheep on similar plots had little effect on control.

Grazing animals and control of weeds. A workshop at Orange examined the role of grazing animals in controlling weeds. Goats and sheep provide a valuable tool to assist with control of many weeds including blackberry, Paterson's curse (*Echium plantagineum*), sweet briar and thistles. Information is being prepared to highlight the use of grazing animals to assist in controlling these weeds.

Variation in St John's wort (Hypericum perforatum). Studies of St John's wort plants, collected from different locations in NSW and grown in a common environment at Bathurst, revealed the existence of a number of forms of this weed. They include a broadleaved form from northern Europe, a narrow-leaved form from southern Europe, a number of intermediate forms and a tall form with distinctive maroon markings. Efforts are being made to distinguish between forms using morphology, cytology, electrophoresis and chemical analysis. There appear to be differences between forms in toxicity to animals and susceptibility to herbicides and biological control agents.

Weed control in vegetables. Weed control trials testing several herbicides have been carried out in rockmelons, watermelons, grammas and pumpkins. A working prototype of an activated carbon seeder to protect vegetable seedlings from herbicide damage was successfully developed and demonstrated to the public at a field day at Mangrove Mountain.

Biological control of Bathurst burr (Xanthium spinosum). Laboratory research on a fungus to control Bathurst burr was completed. The fungus, *Colletotrichum orbiculare*, a naturally occurring pathogen, was produced artificially in submerged culture and applied in water like a conventional herbicide. The product is termed a mycoherbicide. The Department has a patent for the process. Preliminary field studies in the summer of 1987–88 were so promising that the Department decided to seek expressions of interest from commercial firms for the further commercial development of the product.

Weed detector. Experiments were carried out to determine the system characteristics of a prototype weed detector for spraying fallow weeds. The instrument uses red and infrared reflectance to detect individual spaced weeds growing in bare soil or stubble. The width of the detector's field of view will be matched to that of each herbicide spray nozzle on a spray boom so that it applies herbicide only where green vegetation is present. Early results suggest that green vegetation with an area greater than 15 per cent of the field of view can be detected.

Annual grass weeds in reduced tillage systems. Research at Wagga Wagga evaluated ways of reducing the importance of annual grass weeds such as brome grass (*Bromus* spp.), silver grass (*Vulpia* spp.), and barley grass (*Hordeum* spp.) in reduced tillage systems. This involves rotations which allow the use of non-selective herbicides as a basis for cereal production. Several new compounds show promise in broadleaf crops and legume pastures. Longer-term experiments were begun to examine aspects of the biology and ecology of these grasses, and the effect of management practices imposed during the pasture phase on subsequent weed populations.

Herbicide selectivity. Selective herbicides are essential to maintain the high levels of production currently achieved in cropping systems of NSW. In future, economic and environmental restraints are likely to require better performance of herbicides. Accordingly the Department annually conducts detailed assessments of herbicide effects on cultivars and advanced breeding lines of wheat, barley, rapeseed, lupins and field peas at Wagga Wagga. Soil and weather factors responsible for the variable performance of some herbicides were examined in the field and in controlled environment studies. Information gained will improve the efficiency and safety with which herbicides are used.

PRICKLY PEAR (*OPUNTIA* SPP.)

A new Act, the Prickly Pear Act 1987, was introduced concerning the control of prickly pear in NSW. The Prickly-pear Destruction Commission, which has operated since 1925, was abolished. Administration of the Act was assumed by NSW Agriculture & Fisheries.

The former Commission was divided into two groups: a Prickly Pear Surveillance Unit and a Biological Control Research Unit. The Prickly Pear Surveillance Unit carries out property inspection work, advisory and promotional work, regulatory duties associated with the administration of the Prickly Pear Act and chemical field trials. The Biological Control Research Unit is responsible for the research and advisory biocontrol programs throughout the State, and provides supplies of the prickly pear insects for landholders and councils.

Prickly pear is still a major pest weed in many parts of New South Wales. Tiger pear (*O. aurantiaca*), undoubtedly the worst variety, infests 181 000 hectares over 2100 properties.

Research showed that insects and climate are the main factors regulating populations of tiger pear and common pear (*O. stricta* var. *stricta*) in NSW. Long-term monitoring of populations of tiger pear finished at four sites and will continue at another in 1988–89. The two sites studied between mid 1987 and mid 1988 showed large reductions in cactus populations due to tiger pear cochineal (*Dactylopius austrinus*). This followed several years of cactus increase at these sites with little damage from insects. Common pear research carried out along the Turon River (north of Bathurst) began in 1985. In this area cactoblastis (*Cactoblastis cactorum*) failed to control common pear. Common pear cochineal (*D. opuntiae*) was investigated as an alternative biological control agent. To date, numbers of cactus segments in areas without cochineal have almost doubled while in areas with cochineal they have decreased slightly.

PLANT QUARANTINE AND EXPORT SERVICES

COMMONWEALTH FUNCTIONS

NSW Agriculture & Fisheries acts as agent for the Department of Primary Industries and Energy in administering agricultural quarantine under the Quarantine Act 1908 and the export of grain, field crops, fruit and vegetables under the Export Control Act 1982. A formal agreement between the Commonwealth and states to provide these inspection services was signed in June 1987. The agreement covers financial and administrative arrangements.

There are 160 agricultural inspectors employed by the Department. Of these, 70 operate under the Commonwealth Acts. The remainder administer the 10 State Acts for which the Minister for Agriculture and Rural Affairs is responsible, including the Plant Diseases Act, the Horticultural Stock and Nurseries Act and the Seeds Act.

AGRICULTURAL QUARANTINE

Importation of all goods (including plant, machinery and cars) and entry of passengers travelling by sea and air are subject to surveillance for agricultural quarantine purposes.

Passenger clearance by air. A total of 12 269 civilian and 323 military flights were serviced, 1301 more than the previous year. A total of 2 158 250 passengers and crew were cleared, with 19 955 quarantine seizures. The passenger increase was nine per cent but seizures remained the same as in 1986–87.

Passenger clearance by sea. Sixty-five passenger and naval vessels and 83 yachts were cleared, with 468 seizures from 50 168 passengers.

Parcel post. A total of 35 255 parcels were inspected at Clyde and Newcastle; 4651 items required attention for agricultural quarantine.

Containerised sea cargo. Containerised cargo vessels decreased slightly in number from 1071 in 1986–87 to 1055, with 227 214 containers being discharged. A total of 11 868 containers were subject to quarantine impediment.

Insects and related organisms intercepted. A total of 1702 insects and related organisms were intercepted and sent for identification. Some of the more notable interceptions included giant African snail (*Achatina fulica*) on seven occasions, Siricidae woodwasps on 11 occasions and carpenter ants on six consignments of timber. Little fire ant (*Wasmannia auropunctata*) was intercepted on bromeliad plants from the USA. This ant is one of the most serious exotic pest ants that could be introduced to Australia. Navel orange worm (*Paramyelois transitella*) and exotic Tortricidae were intercepted on citrus from the USA.

Nursery stock. There were 270 consignments received with a total of 59 340 plants inspected. This represents a 60 per cent

Entomologists at the Biological and Chemical Research Institute identify and develop control methods for insect pests.

decrease on last year's imports. The decrease is mainly represented by carnations as exporting sources in Europe had their disease accreditation removed owing to high disease levels in plants. The Plant Quarantine Station, Rydalmere, isolated 11 diseases from imported plant material during 1987–88.

Timber. Timber imported totalled 547 797 m^3. Of this, 27 254 m^3 was fumigated for insect infestation. Five hundred and ninety insect infestations were noted during the year, with a marked increase seen in timber of North American origin.

ADMINISTRATION

There were 62 799 import permits issued, raising $3,813,882 for quarantine services. There were 122 prosecutions involving agricultural products during 1987–88, resulting in the imposition of $25,650 in fines.

QUARANTINE REVIEW

The Department participated in the review of agricultural quarantine led by Professor David Lindsay. A draft report was released for comment in May. The major issue addressed was quarantine policy and its implementation. It included attitude to quarantine risk, administrative arrangements and barrier control at passenger entry points. In general the review supported the current quarantine program but made recommendations on streamlining passenger entry and cost-benefit analysis of quarantine policy.

STAFF TRAINING

The staff training policy on uniform quarantine and export inspection services, adopted by the Commonwealth in 1986–87, was developed during the year. The Department's Special Regulatory Officer was appointed as a member of the Curriculum Development Committee and State Coordinator for subject area development.

Bulk grain exports for 1987–88

Grain	Passed (tonnes)	Rejected (tonnes)
Wheat	3 364 099	50 289
Barley	16 793	0
Oats	11 639	0
TOTAL	3 392 531	50 289

District inspections by agricultural inspectors

Sites inspected	Number of inspections
Orchards, etc.	3 027
Fruit shops	4 204
Grain storages	800
Nurseries	1 968
Resellers	1 694
Home gardens	29 875
TOTAL	41 568

Packages detained at markets for non-compliance

Crop	Packages	Bulk bins
Apples	31 354	17
Pears	12 512	2
Oranges	20 505	28
Lemons	3 408	0
Grapefruit	2 154	0
Mandarins	5 140	4
Grapes	3 040	0
Rockmelons	607	0
Bananas	48 624	0
Tomatoes	14 986	0
Mangoes	1 631	0
Potatoes	105 181	5
Onions	13 974	0
Other	10 411	32
TOTAL	273 527	88

EXPORTS

Grains. Inspectors surveyed 90 bulk ships before grain was loaded. Twenty-two of these ships required treatment and re-inspection.

Fruit and vegetables. There was a further increase in the volume of fresh fruit and vegetables exported, with the major markets being South East Asia and the Middle East. Exports to Europe showed a slight increase, particularly of bulk oranges for juicing in the United Kingdom.

The Export Control (Fresh Fruit and Vegetables) Orders came into effect on 1 September 1987 and this resulted in major changes to inspection methods and recording of statistics. All statistics and rejections are being computerised so that new inspection levels based on the performance of individual exporters can be introduced on 1 September 1988.

A total of 7431 export permits and 5792 phytosanitary certificates were issued for fresh fruit and vegetables.

Field crops. Exports to Japan of double dumped baled hay (mostly lucerne) continued but the quantity was less than industry estimated. Most containers required methyl bromide treatment. Statistics on field crop exports are as follows:

- 1503 containers of cotton and cottonseed, mainly from the Namoi Valley
- 277 containers of malt barley from Tamworth
- 5 741 691 kg of seeds and nuts
- 4124 phytosanitary certificates issued for various grains, field crops and other plant products.

STATE FUNCTIONS

PLANT DISEASES ACT

During 1987–88, 533 notices were issued and three prosecutions were undertaken. At the Flemington and Newcastle Wholesale Produce Markets, 2484 detention notices and 4857 castaway certificates for unsound produce were issued.

ADOPTION OF NATIONAL GRADE STANDARDS

Action was taken under the Plant Diseases Act to promulgate the Fresh Fruit and Vegetable Orders developed by the Commonwealth under the Export Control Act. These orders specify the minimum quality of produce and the conditions under which it may be exported. The first of these new standards includes carrots, lettuces, onions, mangoes and blueberries. There will be a three-month amnesty on compliance to give industry time to adapt to the new conditions. Further crops will be covered by the end of 1988. The introduction of these standards will mean that NSW domestic standards will be equivalent to the national and export grading regulations for fresh fruit and vegetables.

PROTOCOL FOR ERADICATION OF EXOTIC PESTS AND DISEASES OF PLANTS

NSW Agriculture & Fisheries developed a protocol of action to be taken when an exotic plant pest or disease is detected. The Chief Quarantine Officer (Plants) is responsible for coordinating action within the State on behalf of the Commonwealth under the Quarantine Act.

MAJOR PEST CONTROL PROGRAMS

Fruit fly. Fruit fly incidence was low in the suppression zone surrounding the MIA and Murray River. This is evidence of success of the monitoring, suppression and control program carried out by the Department with assistance from local councils. However, an outbreak of fruit fly was detected in the Curlwaa area near a roadside rest spot—once again, evidence of fruit fly being transported by travellers. The outbreak means that fruit exported to New Zealand from within an 80 km radius of the outbreak will be subject to disinfestation treatment.

Warehouse beetle. Following the intensive inspection and control program conducted in 1982, the warehouse beetle (*Trogoderma variabile*) population remained generally low. However, early in 1988 some individual heavy infestations were found in the north west of the State. These outbreaks were appropriately treated by the owners of infested premises under the supervision of agricultural inspectors. Inspection of premises for this pest was increased.

European wasp. The past 12 months saw a significant increase in European wasp activity in the greater Sydney region. The European wasp unit, based at Rydalmere, destroyed 742 nests during the period compared with the previous highest number of 318 in 1984–85. This situation was probably due to mild winter weather which favoured the survival of European wasp colonies.

A similar trend was also evident in country areas where 19 nests were destroyed compared with eight in the previous 12 months. These nests were mainly in the Orange-Bathurst, Murray and Riverina districts.

Potato cyst nematode (PCN). Further surveys of potato-growing areas in Western Australia showed the nematode to be confined to 6.2 ha on five properties in a small area of the Perth Statistical Division. Since the discovery of PCN in Western Australia 7 per cent of NSW potato cropping has been examined but no nematodes have been found. It is likely that the disease does not occur here. Provided no further infestations of PCN are detected in Western Australia, a protocol for movement of potatoes into the eastern states will be considered by the Standing Committee on Agriculture Consultative Committee.

Banana bunchy top. After a substantial increase in infections in 1986–87 to 4618, the incidence of this disease declined in 1987–88 to 3666 infections. December 1987 was the worst month for infection with 425 recordings in the Tweed District and 212 in the Brunswick District.

ANIMAL INDUSTRIES

EXTENSIVE LIVESTOCK INDUSTRIES

Sheep

Genetic Improvement in Wool Production

Departmental research and advisory effort, particularly by the Trangie Fleece Measurement Service, continues to play a major role in the introduction of simplified objective breeding programs for sheep. An independent survey of NSW Merino ram breeders and wool producers has shown a higher level of acceptance of performance testing than previously reported. The survey showed that 82 per cent of NSW Merino ram breeders now use a fleece measurement service. Fifty-eight per cent of measurement users are clients of the Trangie Fleece Measurement Service.

Over 48 per cent of NSW commercial woolgrowers take notice of the breeding methods used by their ram supplier and at least 93 per cent believe that the ram breeder should provide performance tested rams at sales. Such information is provided with 75 per cent of the Merino rams (56 000) purchased annually in NSW. Commercial Merino flocks using measured rams join a total of 12 million ewes a year (86 per cent of the ewes joined to Merino rams in 1985–86).

This success is due largely to Departmental research and advisory programs.

The Trangie Fleece Measurement Service is continuing its leading role in the industry with the introduction of the National Performance Recording Scheme, Woolplan. All clients of the Trangie service will receive Woolplan information in 1988.

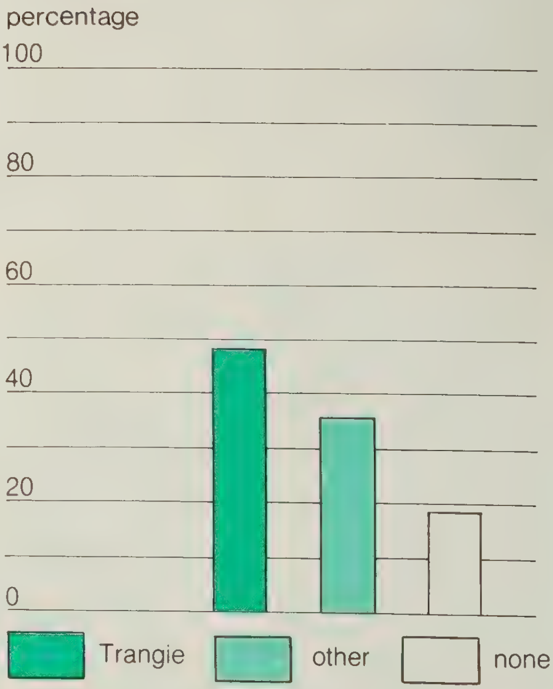
Technical training in sheep breeding and selection was provided to 60 commercial livestock agents during the year. This technical assistance was used in the establishment of a commercial national performance recording service. This service incorporates developments with electronic data collection technology and is compatible with and complementary to Woolplan.

Influential Merino studs have been chosen for on-stud research and development of breeding programs that make optimum use of performance records and breeding technology. The Wool Research and Development Council is supporting this work. It also suported a major training exercise for sheep advisory staff on aspects of breeding and selection during April 1988. These major developments with the Department's genetic improvement program have led to a more effective service for Merino studs in NSW. The progress made with the influential studs will flow through the wool industry to provide improved productivity for commercial woolgrowers.

Sheep and Wool Handling

Capital investment on new and improved sheep yards and shearing sheds is increasing. Livestock officers provided technical advice on the construction of 225 sheep yards and 115 shearing sheds, comprising 340 shearing stands. The total value of this capital expenditure was $5.2 million. Design features and savings resulting from this advice will influence the labour efficiency of sheep and wool handling for the lifetime of these structures.

Percentage of NSW ram breeders using a Fleece Measurement Service



REAL-TIME SCANNING OF PREGNANT EWES

Real-time scanning is a technique developed by NSW Agriculture & Fisheries researchers to determine litter size in pregnant ewes. It has been estimated that 30 per cent of the State's sheep producers are ready to adopt the technique. Scanning allows the pregnancy status of ewes to be identified eight weeks before lambing. Twin-bearing ewes can then be nutritionally managed to improve lamb survival. The separation of single- and twin-bearing ewes for lambing also improves lamb survival. An increase in returns from the sheep breeding enterprise is achieved through higher surplus sheep sales and a wider selection of replacement livestock.

Fleece Measurement Service data combined with visual appraisal is the way for wool producers to increase returns.

Division of Animal Production

Wether competitions continue to attract producer support and are seen as an excellent opportunity to gather information on wool production.

SHEEP BODY STRIKE FORECASTING SYSTEM

Results of blowfly research programs have formed the basis for improved blowfly control recommendations and include aspects of selection for fleece-rot resistant sheep.

A monitoring system to predict outbreaks of sheep body strike is being evaluated with the assistance of NSW wool growers. The conditions favourable to blowfly population build-up are recorded, thus providing producers with an early warning system to allow management of sheep for the prevention of body strike. The ability to predict intense blowfly activity means financial savings in treatment, reduced pesticide use and a sound basis for use of chemicals to prevent flystrike. It is estimated that blowflies currently cost NSW sheep producers over $60 million a year.

SHEEP DAIRYING

There are currently three commercial dairies and one research dairy in operation in NSW with a total capacity to milk 2000 ewes a day. The milk is processed at Leeton for cheese making, with an annual cheese production of almost 80 tonnes. Associated with sheep dairying is an export market for suckling lamb which is supplied with up to 1200 lambs a week.

LAMB EXPORTS TO THE USA

Livestock officers, in association with the Australian Meat and Livestock Corporation and the Department's Export Development Unit, were involved in activities to increase the sales of NSW lamb to the USA. Departmental staff arranged visits by prospective American importers to NSW farms and meat processing plants and organised a series of small field days, meetings and interviews between the respective parties. In particular, the Department has demonstrated the capacity of the NSW industry to supply the type and quality of heavy lean lamb demanded in the USA.

SHEEPSKIN PROCESSING

Livestock Officers have been cooperating with the Department's Export Development Unit to encourage the expansion of value-added processing of the nine million sheepskins produced in NSW each year. This included negotiations between European nappa leather and wool-on skin processors and NSW industry representatives regarding prospective joint ventures to process more skins in Australia. At the moment over 90 per cent of our sheepskins are exported unprocessed. Efforts are being made to improve communication between the various sections of the sheepskin industry in Australia and in assisting sheep producers to supply the type and quality of skin required.

MEATSHEEP TESTING SERVICE (MTS)

This service tests the State's prime lamb sires for their ability to breed meatier, leaner and faster growing lambs and has continued to win industry support. Over half of the 5.5 million lambs slaughtered in NSW in 1987–88 were bred by MTS-tested rams.

The Standing Committee on Agriculture at its February 1988 meeting approved Australia's first trials of a national performance recording scheme for use by the lamb industry in all states. This scheme, to be called Lambplan, is modelled on the Department's MTS.

Success with genetic improvement in meat flocks. An independent survey has shown that genetic improvement within flocks has been achieved by breeders using the Meatsheep Testing Service. Over 91 per cent of studs responding to the survey claimed that leanness had improved, while 84 per cent said growth rate had been boosted in their flocks. The survey studied a cross-section of NSW users and non-users of the service, which has been operating for over six years.

REPRODUCTION

The Department cooperated with the Victorian Department of Agriculture and Rural Affairs and a commercial company, Regulin Ltd, in evaluating a product which aims to manipulate the seasonal breeding pattern of sheep.

These results have been used in the registration of the product Regulin® in NSW.

PASTURE/ANIMAL ASSESSMENT PROJECT (PAAP)

The Department has initiated a project that will supplement existing knowledge of pasture productivity under grazing conditions while at the same time developing the skills of advisory officers in assessing pasture characteristics relevant to livestock production.

Recent developments in computerised management packages, which have the potential to analyse both the physical and financial implications of management alternatives, established the need for the project.

PAAP's objective is to establish 20 sites to monitor major pasture types within the State. Five of these sites are operational.

NUTRITION

Emphasis on sheep nutrition continues to focus on the supplementation of sheep that graze pasture and crop residues.

Support was provided to CSIRO in the development of the Grazfeed computer management package and the investigation of the role of protein as a supplement to sheep when they graze poor quality pasture. Grazfeed will allow advisory officers operating in temperate areas to predict the effect a specific supplement has on some production parameters when sheep are grazing pasture.

A protein supplementation trial was undertaken at Glen Innes to identify and quantify the need for rumen bypass protein supplements for sheep grazing poor quality pasture. The results have widespread implications for the profitable use of such pasture and crop stubble in the sheep production areas of NSW.

Crosses of Bos indicus *and European breeds over British breeds maximises hybrid vigour in the offspring.*

The development of export markets for lamb in North America and the potential which exists in other areas have seen the establishment of a permanent lamb feedlot industry in NSW. Throughput from permanent NSW feedlots in 1987–88 was estimated at 120 000 head worth around $7 million. To build on the Department's existing expertise in lamb feedlotting the Department's sheep nutrition specialist toured Australian and American feedlots.

BEEF CATTLE

CROSSBREEDING

The success of the Department's crossbreeding research and advisory programs is shown by the latest Australian Bureau of Statistics figures, which indicate that a revolution in breeding practices is taking place.

From 1981–82 to 1986–87 significant changes in the NSW beef cattle population occurred:

- The number of pure British Breed females declined by over 30 per cent.
- Pure British Breed herd matings declined by 38 per cent.
- Crossbreed matings increased by over 60 per cent.
- Most of the increase in crossbreeding was in the use of *Bos indicus* and European breeds over British Breeds to maximise hybrid vigour and additive gene traits.

Thirty-two growout field trials have been organised throughout NSW to further demonstrate crossbreeding technology. Producer cooperators have grown out 2500 steers and heifers from the Grafton research project. Field days have been conducted at the conclusion of each trial and have been important venues for the extension of crossbreeding advice to producers.

Victorian weaner growout trial. To demonstrate crossbreeding technology a three-year, weaner growout trial is being conducted with the Victorian Department of Agriculture and Rural Affairs (DARA). It is comparing various genotypes from the North Coast of NSW under Victorian grazing and feedlot production systems. Completion of the first stage of the trial has allowed joint Victorian-NSW onsite field days.

JAPANESE MURRAY GREY PROJECT

The Murray Grey trial by the Department and the Tokyo Metropolitan Government concluded with an officer of this Department visiting Japan to assist with final evaluation procedures.

The net returns from the Murray Greys were superior to the Japanese Wagyu and Holsteins. However, this was mainly because of the comparative purchase price rather than production or carcase characteristics.

Experience from this trial emphasises the need to promote cattle of suitable specification for the live cattle feeder trade to ensure that they perform adequately under the vastly different nutritional management practiced in Japan. Specifications for live feeder cattle and Japanese ox carcases have now been developed for this increasingly important Japanese export market.

BREEDING

The Trangie 'within-herd selection' research project is now generating valuable data on two important production traits:

- Effect of selection for weight gain on feed conversion efficiency
- Effect of selection for weight gain on carcase characteristics and maturity patterns.

The results of this work are being used to determine our future breeding and selection strategies.

A further extension of the program was the establishment of a cooperative venture with DARA. The Trangie herd has been replicated at the DARA Pastoral Research Institute, Hamilton, and at the Department's Glen Innes Agricultural Research and Advisory Station, which will contribute to the databank on this unique project.

The Australian Meat and Livestock Research and Development Corporation (AMLRDC) evaluated the Trangie project (AMLRDC *Annual Report* 1986–87) and outlined the progress made:

'In 10 years the average yearling weight of the high-line bulls and heifers has increased by 30+ kg or 1.5 tonnes of carcase in a 100 animal turn-off.'

'Calves are heavier. The yearlings are longer and taller. The heifers have a larger pelvic area. The bulls have a larger scrotal circumference at all ages. The breeder cows maintain their size advantage through to maturity. First impressions are that there is little difference in the age at puberty among the heifers in calving or weaning rates.'

Increased demand for venison demonstrates the potential for deer farming in NSW.

Breeding workshops. A beef breeding advisory package was developed to be offered in a number of options including a two-day short course and one-off lectures and demonstrations. A number of Beef Improvement Associations and Breed Societies are anxious to sponsor these workshops.

NUTRITION

Trials were conducted on the value of legume grain crops and protein supplements such as cotton seed and on phosphorous deficiency and supplementation in the Western Division.

A grass tetany seminar at Wagga Wagga reviewed strategies for reducing the very serious losses experienced from this disease in higher-rainfall southern Australia. An improved advisory program was developed.

With continued development of the lot-feeding industry, attention has been focused on feeding management and nutrition, particularly on the use of costly additives.

Work with export agents and feed suppliers has improved the management and nutrition of live export cattle. The object was to improve performance during the preconditioning phase and onboard ship.

HANDLING AND TRANSPORT

The Department and the NSW Meat Industry Authority cooperated to conduct 12 seminars at major centres throughout NSW on the reduction of bruising at all stages of the beef production chain. Bruising is estimated to cost the NSW beef industry $25 million annually. A priority inter-regional program has been mounted to halve this cost.

TECHNOLOGY DEVELOPMENTS

The first workshop using the new Beef-n-Omics program has been organised as part of an overall evaluation of Beef-n-Omics. Attendees at some of the original workshops will participate in the evaluation process.

The new Beef-n-Omics program reached the finals of the high-profile, Royal Agricultural Society computer software competition.

New computer software used by advisory officers is helping farmers to improve their management skills and farm efficiency to meet the greater demands imposed by increasing herd size.

RAS BICENTENNIAL SHOW

The Department continued to provide a comprehensive service to the Royal Agricultural Society. At the 1988 Bicentennial Show officers officiated as judges and stewards and acted in a number of support roles.

BEEF 88

Officers of this Department participated in the bicentenary celebration for the Australian beef cattle industry held at Rockhampton.

A display of the Grafton and Trangie cattle research projects was staged at Beef 88 and a departmental beef cattle officer was accorded the distinction of judging the Limousin breed at the largest stud cattle exhibition ever staged in Australia.

DEER FARMING

The potential of the deer farming industry was demonstrated by the increased importation of venison from 27 940 kg in 1986 to 178 164 kg in 1987. This occurred despite the slaughter of 1000 head of deer for venison in 1987.

Export protocol has now been finalised to allow export of deer products and venison from Australia. This will promote the production of velvet antler to an increasing world demand, where prices have almost doubled in the past year.

To further our expertise an officer toured China to study the production and marketing of deer and velvet antler.

Bruce Ware

DAIRY

MARKETING ARRANGEMENTS

The number of dairy farms declined from 2542 to less than 2400, owing primarily to market uncertainty and higher costs. Despite this, production for the year increased by 26 million litres to 928 million litres.

The Dairy Industry Conference approved the Department's recommendation to change the method of testing and expressing the test percentage of fat and protein in milk from mass/mass to mass/volume. This will make NSW uniform with other states and in effect increase the quoted percentage figures for these components by between 0.1 and 0.2 per cent.

NUTRITION AND MANAGAMENT

A large-scale program being developed under the name 'Milkonomics' includes four main components. The first two of these, 'Milk Cost' and 'Feed Plan', have been fully developed.

Milk Cost is now available in all dairying districts throughout the State. The program allows dairy farmers to determine the variable costs of producing milk and to compare these with other farmers' costs. It will enable them to manipulate their management procedures to maximise returns.

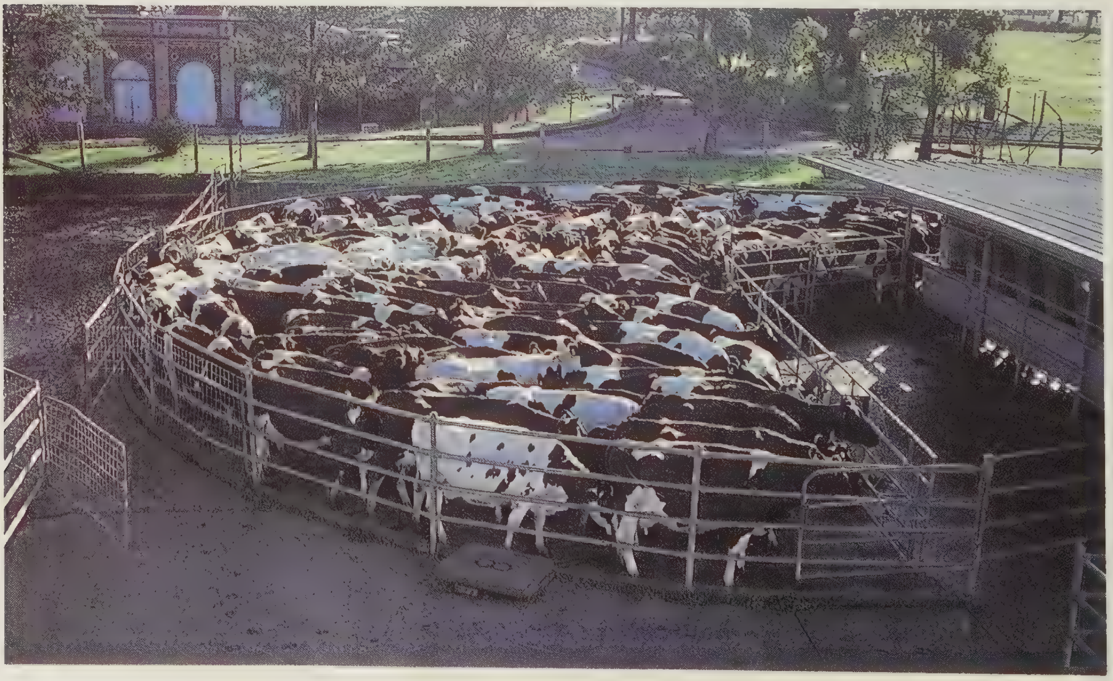
Considerable interest in this program was shown by other states, particularly Victoria and Western Australia. The program is available in a package involving computer processing and reference material at a cost recovery fee of $50.00 per farm. To date, approximately 150 dairy farmers have paid to enrol in the Milk Cost program—nearly twice the number that participated in its predecessor, the Dairy Farm Performance Scheme.

Feed Plan is a computer program that prepares a feed budget for participating farmers to meet the feed requirements of dairy herds economically. The program is available to farmers in the North Coast Region from Taree to Murwillumbah and will be extended to other areas in 1988–89.

DAIRY HERD IMPROVEMENT

During the year 91 500 cows were herd recorded on 960 farms, representing nearly 40 per cent of all farms in the State. Average production per cow was 4476 L of milk, 170 kg of fat and 118 kg of protein.

For the first time all cows were tested for protein. The total cost of the service was $1,154,722 of which farmers contributed 93 per cent. The high proportion of costs met by farmers has led to a 25 per cent increase in the number of farmers who practise farmer- or owner-sampling.



A major, large-scale, artificial breeding program continued for the Holstein-Friesian breed with smaller programs operating for the Illawarra and Jersey breeds. A significant aspect of these programs was the financial contribution of approximately $120,000 made by industry through its 'milk contingency fund'.

Other advisory and educational aids developed by the Department on herd improvement included:

- a computerised 'mating management package' comprising video, overhead transparencies and supporting reference material
- a video outlining the contract mating and progeny testing system used by the Department.

The Animal Genetics and Breeding Unit, a cooperative venture between the Department and the University of New England, carried out research into:

- the evaluation of a procedure for detecting genetically inferior bulls before progeny testing. Preliminary results show that the procedure will lead to substantial reductions in the major cost of progeny testing and to changes in the design of breeding operations
- the theory of mate selection and utility theory which have direct relevance to sire and cow selection and to the design of mating strategies
- new computing procedures which will substantially reduce the research and operational costs of estimating the inheritance of measures of performance
- a detailed evaluation of a different design for dairy cattle breeding programs known as the Nucleus MOET Scheme. This scheme has the potential to increase the economic return through genetic improvement by more than 50 per cent compared with classical progeny testing programs
- a system for the automated identification of cattle, known as Cyclops, which involves a low-cost external tag.

od yard layouts increase milking efficiency.

MILKING MANAGEMENT

During the year the State's average herd somatic cell count fell from 400 000 to near 300 000 cells per mL. This drop resulted in a net return of about $4 million to the dairy industry from increased production. Introduction of a maximum acceptance level of 1 million cells per mL by the NSW Dairy Industry Conference contributed to this success by encouraging farmers to adopt the Department's program.

DAIRY GOATS

During 1987–88, the Department conducted a major workshop on goat milk quality standards, and organised a forum and a report on 'Regulatory Arrangements for the NSW Goat Milk Industry'.

MARKETING

Livestock officers have continued to assist the introduction of computerised livestock trading in NSW by cooperating with Computer Aided Livestock Marketing (CALM) in conducting special educational activities to ensure that sheep, beef and pig industries make best use of this selling system. These activities included special training courses for livestock assessors plus field days and assessment demonstrations for producers. The number of stock traded on CALM as a percentage of stock traded on all selling systems was considerably higher in NSW than in other states.

Trials conducted in cooperation with the University of New England and CALM have shown the advantages of computerised selling for leaner, higher-quality meat. Lean lambs lose less carcase weight in the course of handling and transport through CALM than they do through the more stressful saleyard system.

The Department has supported the introduction of AUSMEAT, the meat description language which has now been introduced in all 17 export abattoirs and six of the domestic abattoirs in NSW. In addition, 18 boning rooms, four canneries and four processing plants have been AUSMEAT-accredited in NSW. The feedback system to producers selling over the hooks at AUSMEAT-accredited abattoirs is an innovative and significant development in marketing.

All beef cattle, sheep and pig livestock officers of this Department have participated in AUSMEAT-sponsored seminars.

LIVESTOCK MARKET REPORTING SERVICE (LMRS)

Assistance was provided to the NSW Meat Industry Authority with the introduction of the new LMRS from 4 April 1988. This new, objective market report incorporates both fat and muscle scores.

Twelve seminars were jointly conducted across the State and at various sales and carcase competitions to promote the new LMRS.

FEEDS EVALUATION SERVICE

During 1987–88 the Department's Feeds Evaluation Service at Glenfield analysed 2330 samples of feed for the extensive livestock industries. Of these, 574 were grains, 350 scrubs and 900 pasture and forages. The remainder were by-products and miscellaneous feeds. In cooperation with district agronomists 660 samples were analysed from 17 agronomy trials conducted at various locations throughout the State. The service accepts only samples submitted by Departmental staff.

The feeds information database is now operational and available as the Feeds Enquiry System (FES) on AGNET. The database contains information on 3500 feed samples and is designed for ready access by advisory officers.

The time taken to analyse grain and mixed feed samples has been reduced by the use of near-infrared reflectance spectrophotometry (NIR). Approximately one third of all samples submitted to the Service were analysed by NIR during the last 12 months.

During the year the variation in nutritive value of oats grain was further investigated. A strong relationship was found between the fibre content of the grain and its digestibility confirming the basis of our prediction equation for digestibility. However, the metabolisable energy content of oats grain was generally higher than previously estimated. Investigations have begun into the factors that affect protein quality in feeds.

ANIMAL SYSTEMS

In recognition of the rapidly developing potential offered by the application of computers in the animal industries, an Animal Systems Group was established within the Division of Animal Production early in 1987. The group, now staffed by two agricultural scientists and a computer programmer, plays a major role in the identification, development, provision and support of computer applications within the Division.

A user-friendly inquiry program has been developed to provide all staff with easy access to the feeds database maintained by the Department's Nutrition and Feeds Evaluation Unit at Glenfield. The group is also participating in discussions with CSIRO with the aim of providing access to a national feeds database.

The Beef-n-Omics program was rewritten, broadening the range of management options which it considers, better suiting it to its use by advisory officers in workshops with farmers. In addition, this program is being used by the Victorian Department of Agriculture and Rural Affairs (DARA) and agricultural students at Hawkesbury Agricultural College and the University of New England.

Industry funding was obtained to provide five pig industry advisory staff with the CSIRO 'Auspig' modelling package, and to train them in its use.

Collaborative projects have included a major revision of the University of Sydney's 'Camdairy' ration formulating program, and the continued development of the CSIRO 'Auspig' modelling package. Industry funds have been obtained for the wider adoption of the DARA's 'Sheepo' model, and to modify it for use in major sheep growing areas of NSW. Cooperation with CSIRO Division of Plant Industries will give access to a range of computer programs for use in the grazing industries.

COLLABORATIVE RESEARCH

THE ANIMAL GENETICS AND BREEDING UNIT (AGBU)

AGBU is a joint venture between the Department and the University of New England (UNE), located on the UNE campus at Armidale. It was conceived in 1976 and started with two scientists as a research and development institute to facilitate and promote the application of genetics by Australia's livestock industries. The current staff comprise eight scientists and one extension specialist, plus postgraduate students and secretarial support.

The Unit's National Breeders' Schools are always fully booked and it has recently been asked to offer these schools internationally.

CALM complements the traditional saleyard approach to the marketing of livestock.

The Unit's primary research and development activity involves a new area of theory for the genetic evaluation of livestock, known as mixed model estimation and prediction. Advanced mathematical, statistical and computing strategies are involved. The significance of these procedures is that, although they are complex in detail, the seed-stock producer and industry can maximise productivity gains. The highly popular Breedplan and Group Breedplan systems designed by AGBU for the beef industry are applied examples of this theory. The Unit has also developed and implemented similar procedures for the dairy industry and is now researching them for the pig industry. Collaborative projects are under way with the Department of Animal Science, CSIRO, and other Australian universities and departments of agriculture.

The Unit receives most of its funding from industry and industry organisations.

Automatic identification and recording. A major research initiative at AGBU is a system for automated identification of animals. The aim is to develop practical systems for livestock.

There are now five separate products with commercial potential arising from the project. The most advanced commercially is the original optical system, which has been licensed to and is now being marketed by a new company, Amskan Ltd. The most advanced technically is a radio frequency (RF) implant, which is several years from commercialisation.

GOATS

The Department and the University of Queensland are conducting a comprehensive goat research program on the inheritance of production characteristics and the physiology of nutrition, growth and reproduction.

The group uses the Department's resources at Pearce's Creek Field Station at Wollongbar (2000 goats) and the University's Mt Cotton Research Station (500 goats). An important function of the group is the training of postgraduate students; currently seven are conducting research projects. Three Ph.D. students are involved in the Department's research on reproduction in the goat.

Scientists from the group are also involved in development projects in the South East Asia/South Pacific area as well as in training personnel from the region.

The group has received considerable financial support from the Kinross Cashmere Co., the Australian Meat Research Committee (now AMLRDC), the Australian Special Rural Research Fund and the Rural Credits Development Fund.

PIG NUTRITION

Two collaborative projects are being undertaken by the Pig Research Unit, Wollongbar, and the Universities of Queensland and New England.

In the first, the value of raw sugar as an energy source for growing pigs is being investigated. In the second, the availability of phosphorus in feed ingredients is being determined. In both cases the research work is being undertaken by postgraduate students, located at Wollongbar, and enrolled for their Ph.D.s at the University of Queensland or the University of New England. The projects are

Measurement of fibre length gives a good estimate of production potential.

John Burt

being supervised by staff from the Pig Research Unit and the respective universities. Both projects are receiving financial support from industry research bodies.

REGULATORY SERVICES

MANUFACTURED PRODUCTS

For the 12 months ending 30 June 1988, 1279 manufactured products were registered by 176 wholesale dealers.

Manufactured products were checked for compliance with labels. Of 192 products sampled, only 18 failed to meet the minimum crude protein guarantees. Two companies (five products) were successfully prosecuted.

PESTICIDE RESIDUES IN STOCKFOODS

From 1 July 1987 to 31 March 1988, 63 samples of grains (wheat, oats, barley and sorghum) were taken at various retail produce outlets throughout NSW. One sample of oats contained dieldrin at a level of 0.02 mg/kg. Organochlorines were not detected in the other 62 samples. The Department ceased grain surveys on 1 April 1988 owing to an almost complete absence of contamination and, more importantly, the response by industry in taking the responsibility for testing. The silo storage testing program and monitoring of animals and animal products will monitor pesticide residues.

Collaborative research with the University of Queensland is establishing sound breeding practices for the expanding goat industry.

Five dairy producers were 'off-supply' as a result of dieldrin-contaminated barley being fed to dairy cows. The grower responsible has been charged.

A grain grower was prosecuted for selling barley contaminated with BHCs. The contaminated barley resulted in 500 pigs being destroyed at one piggery. Total loss is estimated at $200,000. The grain was also detected in a second piggery but was intercepted before use.

INTENSIVE LIVESTOCK INDUSTRIES

APICULTURE

POLLINATION

Research has again demonstrated the potential that pollination has for increasing yields in field, horticultural and vegetable crops. Studies on 25 commercial sunflower cultivars indicate variation between cultivars in response to the addition of honey bee hives from 15 per cent to 78 per cent, or a potential increase in gross returns to the sunflower industry of between $4.8 million and $24.8 million a year.

Further work using advanced irrigation and pollination techniques indicates a potential doubling of the value of the lucerne seed industry from its present level of $26 to $28 million a year and possible development of a lucerne seed export industry.

GENETIC IMPROVEMENT

The first year of a genetic improvement program conducted jointly with Hawkesbury Agricultural College was completed. The program aims to provide superior genetic quality queen bees to beekeepers. This year 55 queens were offered for sale by auction with a top price of $185.

BEE BRIEFS

This newsletter is now in its fourth year of publication. All commercial beekeepers and about 30 per cent of non-commercial keepers receive copies. Circulation rose from 1486 to 1520 copies.

Queen Bees

Canada has lifted import bans on queen bees from Australia and breeders have been unable to satisfy the export demand. Approximately 12 000 queens were exported to Canada last year into a market which is capable of taking 120 000 a year. The local industry will be better able to satisfy overseas demand for queen bees in future seasons.

Access to National Parks

An interdepartmental committee investigating apicultural needs in National Parks was established and comprised officers of the Department and the National Parks and Wildlife Service. Twenty-three submissions were received by the committee.

Apiaries Act 1985

In the last year 1633 hives were destroyed or irradiated following positive diagnosis of the presence of American Brood Disease and 12 complaints about nuisance bees were addressed.

Protein Content of Pollen

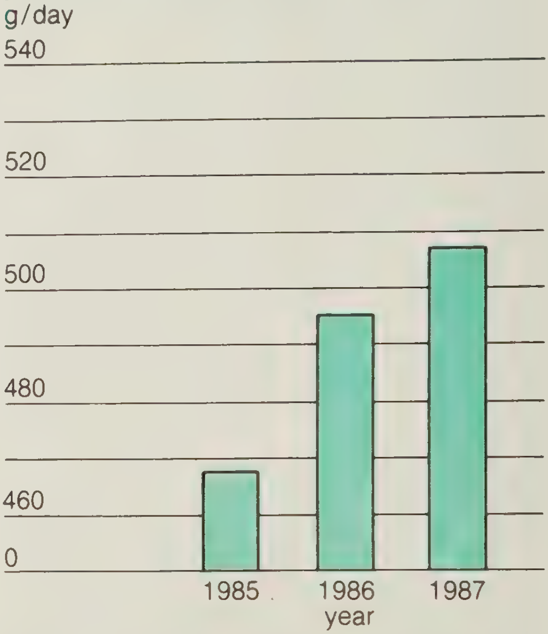
Considerable variation in pollen quality and Quantity exists between flowering species. Forty pollen samples from the North Coast and Northern Tablelands and 21 samples from lucerne pollination trials at Trangie have been collected and analysed. Results to date indicate that crude protein content varies from 7 to 32 per cent, that a number of amino acids have a similarly large variation and that the essential amino acid *iso*-leucine appears to be low in most pollens. A pilot study was begun to determine the effects of supplementary feeding of *iso*-leucine.

Pigs

Improved Pig Management Program

Now in its third year, emphasis of this program was on survival of pigs from conception to market, with the objective of increasing to 20 the number of piglets sold per sow per year. Twenty-two 'Piglets to Profit' workshops were conducted and a comprehensive manual was issued to participants. The farm management recording scheme 'Piggy Bank' is being used to evaluate the progress of the program. Average growth rates have improved to 507 g a day, which is an increase of 12 g a day on the previous year and 40 g a day over the previous two years. This represents a reduction in production costs of approximately $2 a pig, or an annual saving to the industry of $2 million.

Improved pig management has increased average daily growth rates



Boar Test Station

Three hundred and sixty-six boars were tested at the station during the year. Industry acceptance of the value of tested boars was shown by the demand for boars at sales held at Lismore, Forbes and Gunnedah. The highest price received for a boar was $3,100 with an average of $1,054. These figures compare with an expected top price of $1,000 and an average of $500 for on-farm sales of untested stock.

Growth rates of tested boars improved over the previous year by 8.3 per cent for Landrace and 7.3 per cent for Large Whites. Backfat levels reduced over the previous year by 5 per cent and 3.5 per cent.

Least-Cost Diet Service

Using least-cost diet computer programs, livestock officers formulated over 1000 diets to assist producers in the preparation of cost-efficient diets using alternative feed sources. It has been estimated that this service has reduced feed costs by $15 to $20 a tonne. A 50-sow piggery would save $3,750 to $5,000 a year.

Pig Attendant Course for the Unemployed

The Department assisted TAFE in a 12-week short course to train unemployed people as stock attendants. A number were successful in obtaining positions on piggeries at the conclusion of the course.

PIG SHED ENVIRONMENT STUDY

Inappropriate environmental conditions in pig sheds are costing the NSW industry about $15 million annually.

An electronic system to continuously monitor temperature, humidity and air speed in pig sheds is in the final phases of development at Parkes.

BALANCING FOOD INTAKES

Experiments were conducted to determine whether grower pigs could balance nutrient intake when offered protein concentrate as a separate supplement to the cereal base. Total feed intake was similar, but pigs offered the choice of nutrients ate more cereal and less protein than those offered balanced diets. Imbalance in the diet of choice-fed pigs reduced their feed conversion efficiency.

HIGHER-ENERGY DIETS FOR WEANER PIGS

The performance of piglets was assessed through the creep-weaner phase of development, where they were offered one of two diets which differed in energy and lysine content. Subsequently, the performance of the piglets was assessed when given other diets over the grower period. In the creep-weaner phase, piglets given the higher-energy diet ate significantly more feed and were significantly heavier at seven weeks of age. When restrictively fed during the subsequent grower phase they grew 4.6 per cent faster and were 5.1 per cent more efficient in feed conversion efficiency.

NEW APPROACH TO DETERMINING LYSINE REQUIREMENTS AND USE BY PIGS

Raw sugar can replace cereal base as the energy source in research diets for growing pigs. Raw sugar has the advantage that it is a pure energy source, free of amino acids and fibre. Thus the digestibility and availability of amino acids from various sources can be compared.

Well performed pigs from the Tocal Boar Performance Test Station attract premium prices at auction.

POULTRY

LAYER NUTRITION AND FEEDING PRACTICES

The Department's Feed-n-Lay program has improved the efficiency of egg production by encouraging farmers to measure and record daily feed intake, eliminate feed wastage and adjust their diet formulation according to the feed intake and egg-mass production of their flocks. Least-cost computer programs were used by advisory officers to formulate more than 400 poultry diets for farmers during the year. Over 200 stockfeed ingredients and diets were chemically analysed as part of the Department's nutrition advisory services.

A demonstration project was conducted at Seven Hills on the choice-feeding of caged layers which showed that it is practical and increased net profit by $1 a bird. This feeding practice is now being more widely promoted and adopted.

Field trials conducted into natural yolk pigmenters in layer diets showed little difference in cost-effectiveness. Natural yolk pigmenters are now being more widely used in the industry. Other trials demonstrated that feeding zeolites in an effort to improve shell quality decreased egg production, feed consumption and feed conversion efficiency.

The Department's advisory officers co-operated with the NSW Egg Corporation, the NSW Farmers' Association and the University of Sydney in investigating shell quality and egg handling problems. Data were collected on the shell quality of all strains in the Department's Random Sample Layer Test and on farms throughout NSW. Results to date indicate that further improvement in egg shell quality can be achieved through nutrition.

LAYER FARM MANAGEMENT

The Department's Egg-o-Nomics program incorporates the National Farm Management Recording Scheme (NFMRS), the NSW Ran-

NSW breeding lines will be improved by the importation of superior blood lines from overseas such as the squab breeder.

Ian Embury

dom Sample Layer Test (RSLT) and a series of Local Consensus Data (LCD) studies. Through the comparative analysis of data from these three sources it has been possible to monitor the technical and economic progress of the industry and to identify the major factors limiting the efficiency of egg production in NSW.

This information has been used extensively by participating farmers, the NSW Farmers' Association and the NSW Egg Corporation as a basis for planning and decision making. It has also been used by the Poultry Research Council and by NSW Agriculture & Fisheries in planning research and advisory programs.

Industry funds enabled the coordinator of this program to visit the USA to study techniques for the collection and analysis of performance data and the development of computer models for whole-farm economic planning.

LAYER HOUSING

The Department's Envir-o-Lay program is part of a national program that is being supported by industry research funds.

Electronic data loggers were used to monitor environmental temperatures in poultry houses. Software was developed and tested to analyse the data. This work will be expanded when additional instruments become available.

A bibliography of research and extension publications related to poultry housing and environmental control was updated and published.

Departmental officers provided advice to producers on the costs and benefits of regulating poultry house temperatures. An 'expert systems' computer model was developed to facilitate this process.

GOOSE PRODUCTION

A survey of the goose industry conducted in November 1987 indicated that egg production and hatchability over the last two years increased by 50 per cent and growth rate improved by 25 per cent.

OTHER SPECIES

Departmental officers answered numerous enquiries for information on the commercial production of waterfowl such as ducks and geese, and game birds such as pheasant, quail and guinea fowl.

A departmental officer obtained industry research funds to undertake a three-month course at Loughry Agricultural College, Northern Ireland, to develop expertise in the area of waterfowl and game birds.

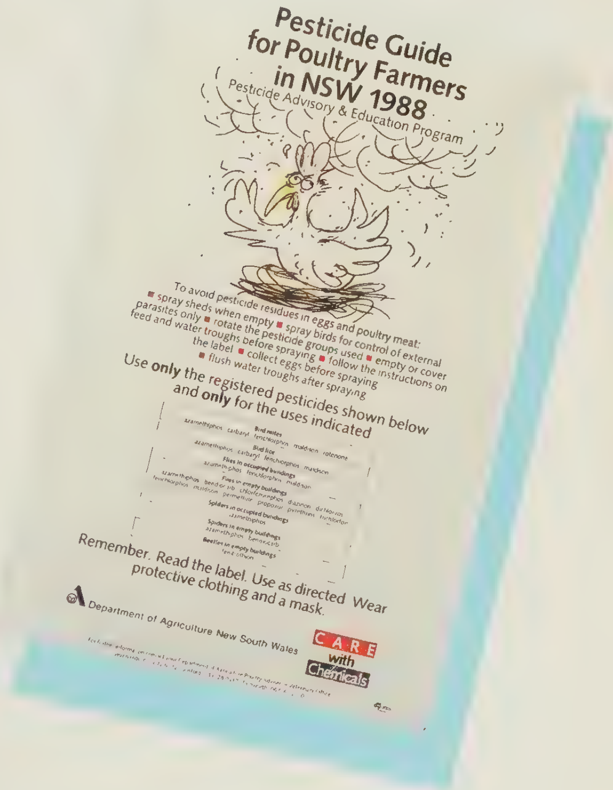
POULTRY WELFARE

A draft 'Code of Practice for the Welfare of Domestic Poultry' was prepared and distributed to all poultry farmers in NSW along with explanatory information on the calculation of stocking rates and alternative systems of housing layers.

PESTICIDES AND OTHER CHEMICALS

The Department's Livestock and Veterinary Officers planned and implemented inter-regional advisory programs on the use of pesticides and other chemicals in the egg and poultry meat industry.

Industry funds were received for research into fly control on poultry farms and further funds have been sought to evaluate methods of controlling external parasites that minimise the use of pesticides.



Pesticide Guide for Poultry Farmers in NSW 1988

Pesticide Advisory & Education Program

To avoid pesticide residues in eggs and poultry meat: ■ spray sheds when empty ■ spray birds for control of external parasites only ■ rotate the pesticide groups used ■ empty or cover feed and water troughs before spraying ■ follow the instructions on the label ■ collect eggs before spraying ■ flush water troughs after spraying

Use **only** the registered pesticides shown below and **only** for the uses indicated

Bird mites
azamethiphos carbaryl fenchlorphos maldison rotenone

Bird lice
azamethiphos carbaryl fenchlorphos maldison

Flies in occupied buildings
azamethiphos fenchlorphos maldison

Flies in empty buildings
azamethiphos bendiocarb chlorfenvinphos diazinon dichlorvos fenchlorphos maldison permethrin propoxur pyrethrins trichlorfon

Spiders in occupied buildings
azamethiphos

Spiders in empty buildings
azamethiphos bendiocarb

Beetles in empty buildings
fenitrothion

Remember. Read the label. Use as directed. Wear protective clothing and a mask.

Department of Agriculture New South Wales

CARE with Chemicals

For each of the major livestock industries the Department has initiated advisory programs dealing with the use of pesticides and other chemicals.

ANIMAL HEALTH SERVICES

LIVESTOCK HEALTH PROGRAMS

SHEEP HEALTH

Ovine Brucellosis Accredited Free Flock Scheme. Ovine brucellosis is a contagious disease of rams which reduces reproductive performance.

The Ovine Brucellosis Accredited Free Flock Scheme provides a list of ram flocks in NSW which are free from ovine brucellosis. Sheep industry and veterinary practitioner support for the scheme has continued at a very high level during the year. There are now 1105 individual sheep flocks accredited under the scheme compared with 1044 flocks 12 months ago. The increase is higher than for each of the previous three years. This is because most agricultural societies in NSW now require that studs be accredited under the scheme before they are allowed to exhibit at local shows.

Footrot. Footrot costs the NSW sheep industry at least $30 million a year in production losses and costs of treatments. Footrot affects at least 4.5 million sheep in over two thousand flocks in NSW. In recognition of the major importance of footrot a draft Footrot Strategic Plan was prepared and widely circulated to industry. The plan proposes eradication of footrot through the progressive establishment of Footrot Protected Areas in NSW. A Footrot Protected Area has operated successfully in the New England since 1960.

The footrot eradication program as detailed in the Strategic Plan is essentially long-term—15 years is seen as a realistic objective. Success will therefore depend on a long-term commitment from industry.

The draft plan proposes that Pastures Protection Boards (PPBs) will be responsible for the field eradication of footrot in their districts and that the Department of Agriculture will be responsible for coordination, laboratory work and technical support. Each Regional Veterinary Laboratory will carry out virulence testing of *Bacteroides nodosus* (the organism causing footrot) to assist field staff to advise producers. The eradication program will be industry-funded through increases in PPB animal health rates. It was encouraging to note that the Yass PPB was planning to appoint a footrot officer to assist producers in the Bialla area to eradicate footrot. Other Boards were considering similar appointments.

SHEEP WORM CONTROL

Wormkill. This program of internal parasite control by strategic drenching moved into its fourth year in the New England area of NSW. Cost savings to the sheep industry are now estimated at between $3 and $4 million. Around 90 per cent of sheep producers in the New England have now adopted the program. The Department and Pastures Protection Boards continued to provide a backup service to producers; veterinary staff made a number of property parasitological investigations.

Wormkill 2, which was introduced in 1986, proved successful on those properties which had successfully used the original Wormkill program of three Seponver ® treatments.

Anthelmintic resistance again proved to be a significant problem with these programs. Many properties had drench resistance to both the benzimidazole and levamisole/morantel drench groups.

The release of Ivomec ® in early 1988 provided a third broad-spectrum anthelmintic that could be incorporated into both the Wormkill and Drenchplan programs. It has been stressed to producers that the same recommendations for usage that apply to the other broad spectrum anthelmintics should be applied to Ivomec ®.

A Wormkill newsletter was direct mailed to 6000 sheep producers. A number of well attended field days on Wormkill were also held throughout the Wormkill target area.

Drenchplan. Drenchplan ended its second year in Central and Southern NSW with an estimated adoption rate of 40 per cent. This was considered an excellent response.

Anthelmintic resistance was recognised as a serious problem in many sheep flocks. Failures of Drenchplan were associated with black scour worm (*Trichostrongylus*) resistance to the benzimidazole and levamisole/morantel drench groups. This was a problem particularly in some Southern Tablelands flocks.

Veterinary field and laboratory staff provided a Drenchplan backup service to producers by investigating field problems.

Licekill. The Licekill program has met with good acceptance from the grazing community, field veterinarians and industry. The program has resulted in an increasing number of graziers seeking advice on lice control in their flocks now that the fear of quarantine has been removed. It has been largely responsible for the early detection of pyrethroid resistance in sheep lice. Research work, supported by Australian Wool Corporation funds at the Veterinary Laboratories, Glenfield, is monitoring the development and prevalence of resistance and aims to develop a diagnostic kit for field staff to detect the presence of resistance in flocks.

The development of pyrethroid resistance has meant that the back-line treatments, which accounted for over half of the lice treatments in the previous 12 months, are no longer effective on a number of properties. If the trend continues, then the use of back-line treatments will be reduced and graziers will have to rely on plunge and shower dips using either organophosphate or pyrethroid chemicals. The level of resistance detected is low enough for pyrethroid treatments to be still effective in plunge and shower dips.

Field staff have become more proficient at investigating sheep lice problems and in offering advice on the best methods of control. They are also offering advice on the control of other diseases associated with dipping, such as dermatophilosis and itchmite. The program will continue with increasing emphasis on lice control management to reduce the emerging problem of pyrethroid resistance.

As part of the Licekill program, advice has also been given on pesticide residues in sheep. The need to use pesticides carefully and correctly has been emphasised. The development of residue testing in wool by the Australian Wool Corporation allows for the detection of properties where insecticides have been incorrectly used. Preliminary results indicate that chemical residues are not a problem in wool from NSW flocks.

Fox Predation

As a flow-on from several investigations into sheep fertility in the far south west of NSW it became apparent in 1985 that fox predation was a major cause of death amongst newborn lambs.

Field research over the last three years has aimed to assess the impact of foxes, to define the extent of predation and circumstances when it is likely to be significant, and to determine the best method of fox control.

The study has involved nine properties in the South West. Each mob was checked for conception rate, lambing percentage, the rate and causes of lamb death and other relevant lambing details. Fox population density, dietary habits and control techniques were also investigated on these properties.

On four of the five properties on which fox destruction has been carried out there has been a lift in lamb marking percentages of 15 to 25 per cent.

These impressive improvements in flock reproductive performance have been maintained on two properties in subsequent years, with owners undertaking their own fox control, and in the face of harsh seasonal conditions.

Predation by foxes is encouraged by:

- suitable habitat and shelter for foxes
- a high fox population, resident or nearby; foxes are known to travel at least 25 km to hunt
- a low death rate in lambs from other causes
- lambing out of step with or isolated from neighbours
- low availability of alternative food such as rabbits, dead ewes and kangaroos.

The most successful method of destroying foxes appears to be the use of large numbers of buried 1080 meat baits placed along a dragged trail. The buried baits are highly attractive to foxes and pose minimal risk to wildlife and other animals in the area.

An advisory campaign using radio, newsletters and information sheets was run concurrently with this field research. As a result it is anticipated that many graziers in the South West will begin fox destruction programs or improve existing practices. Pastures Protection Board rangers in this area have for the first time been requested to prepare 1080 fox baits for local properties. As a consequence, the regulations concerning the use of 1080 for fox baiting have been altered. The restriction of 50 baits per issue has been lifted and the number now being issued is left to the discretion of the authorised control officer. This represents a substantial improvement for Western Division landholders who have hundreds of foxes to kill.

Many of the factors encouraging fox predation also occur in areas of the State other than the Western Division. Heavy losses to foxes have been recorded as far away as the North Coast and New England areas. The findings in the Western Division have highlighted the costs of this covert predator to the Australian sheep industry. It should now receive much closer attention from graziers and rural researchers.

RANGELAND NUTRITION

- Research at Hillston has shown that certain low-fibre leguminous diets may cause the release of ammonia in the digestive system of sheep, cattle and goats. The involvement of ammonia toxicity in a series of previously poorly understood problems (for example, bloat, pulpy kidney, redgut, ill-thrift and failure to eat on low-fibre diets) is being investigated.
- An advisory program to explain the relationship of feed and bodyweight to ewe performance has been initiated and a research project is being carried out on a mob of maiden ewes on regenerated saltbush country. The project aims to assess all facets of the ewes' productive lives including wool production, numbers of lambs carried, numbers of lambs born and reared, lamb survival and ewe bodyweights and body conditions.
- The semiarid areas supply a significant proportion of the sheep and goats exported from NSW. The health of animals in transit to market is dependent on their preparation on the farm. An advisory program has begun to inform producers of the basic husbandry required for stock before travel.
- The characteristics of rangeland pasture are being documented by the Department's field staff and the Field Evaluation Unit at Glenfield. Chenopods (such as saltbush, bluebush and copperburr) have been found to be a useful protein supplement.
- Combination of low energy/high protein medic clovers with dry grass has been found to assist wool growth, body muscling, milk production and lamb growth. Dry speargrass has been found to have low nutritional value, explaining the poor productivity of sheep on speargrass pastures. Sowing cereals or legumes, spray topping green speargrass (to preserve as standing hay and to prevent seed set), slashing and the provision of small stands of chenopods as protein supplements are options being developed to handle years of heavy speargrass growth.

BEEF CATTLE HEALTH

Internal parasites. Cattle owners were surveyed to determine their worm control practices. They were also asked to rate the importance of internal parasites in their enterprise. The results indicated an extremely wide variation in both the frequency of drenching and the importance of internal parasites.

A worm control program for cattle is being developed for NSW. Because of the wide variation in parasite species, climate, pasture and stocking rate, it will be necessary to develop a range of options to allow cattle owners to select the right option for their enterprise.

Bloat control. A recent review by departmental staff estimates that in the New England and Hunter Regions, total costs and losses incurred by beef producers through bloat average more than $11 million a year. This is about six per cent of income from beef production. Whilst many control measures have been used in the past, none of them is satisfactory on an area basis.

During the spring of 1987 a limited launch of the Monensin ® Anti Bloat Capsule was made on the Northern Tablelands. Results were monitored. Whilst the capsules were not without some problems, most users rated them superior to available alternatives. Losses in treated cattle were far less than would have been expected without treatment, despite cattle grazing on high-risk pastures.

The capsule is not registered for use in lactating dairy cows.

Johne's disease. Queensland's introduction in 1987 of stringent movement controls on store cattle from Johne's disease high-risk districts in NSW seriously affected North Coast sales of store cattle to Queensland. At Casino Saleyards cattle sold to the Queensland market brought around $50 a head less than cattle sold to NSW buyers. This difference was accounted for by the costs of Johne's disease testing by veterinary practitioners.

Unsuccessful representations were made to Queensland authorities seeking a relaxation of their serological testing requirements. Efforts are continuing as it is believed that the risks of introducing Johne's disease to the Queensland industry from cattle imported from the North Coast of NSW are very small. Only 17 cattle from 11 NSW herds were confirmed with Johne's disease in 1987–88.

DAIRY CATTLE HEALTH

Genetic diseases. The Murray Grey Breed Society began a program of eradication of alpha mannosidosis. Costs of laboratory testing have been met by the Society's members. Stud breeders have been offered the opportunity to conduct a single whole-herd test at a reduced fee of $2.50 an animal. Testing of larger groups of animals can be done with the simple plasma test. Previously the Society required testing only of bulls which involved the use of the granulocyte test ($25 a test). The advantage for the Society is that the disease can be eradicated rather than reduced, with commercial advantages for the export of cattle. During 1987, 5300 tests were conducted on cattle from 240 herds. The aim is to complete the testing program by the end of 1988.

The inherited defect citrullinaemia was introduced into Australian Holstein-Friesian cattle by the use of semen from the Canadian bull, Linmack Kriss King. A test to identify carrier animals is now under development in collaboration with medical researchers in Houston, Texas, and at Sydney University.

A similar defect occurs in children. Surgical transfer of a kidney from a normal calf to an affected calf successfully modified the onset of the biochemical changes that normally lead to death, suggesting a new form of treatment that may save the lives of affected children.

An inherited condition in Poll Hereford calves, congenital myoclonus, has been shown to be due to a failure of glycine receptors in neural transmission in the spinal cord. The rigidity seen in affected calves is caused by a blocking of the feedback loop which controls the strength of muscular contraction. Strychnine has a similar effect, by binding to the glycine receptors. Collaboration with researchers in Heidelberg, Germany, and at Sydney University may lead to methods of control of the disease.

Pestivirus project. A three-year research project investigating the epidemiology and effects of pestivirus infection in dairy cattle started this year. It is funded by the Australian Dairy Research Council.

Pestivirus is widespread overseas. In Australia, its effects in beef cattle have been investigated by departmental staff. The situation in dairy herds, however, is not well understood.

The results of this project will provide better understanding of how pestivirus spreads and what losses it can cause in infected dairy herds. This will assist development of control measures to be taken in infected herds to reduce losses and possibly stimulate the development of a vaccine in Australia to control and prevent the infection.

The research project has three parts. At the Central Veterinary Laboratory, Glenfield, improved diagnostic tests are being developed. To date, monoclonal antibodies have been identified, an ELISA has been developed and immunoperoxidase staining of cultured cells is being evaluated as a technique to simplify virus isolation procedures.

A second part of the project is being undertaken by the Virology Section of the Central Veterinary Laboratory, Glenfield, and the University of Sydney's Department of Veterinary Clinical Studies. Results indicate that pestivirus infection at mating can cause significant embryonic loss.

In the Hunter Valley the third part of the project is under way. Studies of immune and infection status of heifers in 40 herds have shown that, even where there is some pestivirus immunity, about a third of heifers are still susceptible to infection. The progress of the disease and the losses it causes will be studied.

Three known infected herds in the Hunter Valley are being monitored intensively to study the spread of the virus and the losses it causes. These herds are being blood-tested every four months. Reproductive problems and calf problems are being investigated by veterinary practitioners and departmental staff.

Selenium deficiency in dairy cattle. In this project, half the cows in each of 17 commercial dairy herds were supplemented with selenium pellets. The incidence of mastitis and the breeding and health history of the herds were recorded. All herds had low average glutathione peroxidase activities (indicative of low selenium) before supplementation. No differences in fertility have so far been recorded between the supplemented and unsupplemented cows. However, the herds have been monitored for at most one lactation so these results are preliminary. Second lactation information is now being recorded.

In two herds in the Hunter Valley, supplementation appeared to decrease the incidence of clinical mastitis. On one farm over 12 months, 14 cases of clinical mastitis occurred in the unsupplemented cows compared with only two cases in the supplemented group. No difference in the incidence of subclinical mastitis or other diseases (endometritis, retained placenta and foot-rot) has been observed.

MASTITIS CONTROL

Mastitis Advisory Program. The primary objective of the mastitis advisory program is to decrease the amount of milk production lost in NSW through mastitis. The level of mastitis within the dairy herds of NSW is measured using the number of somatic cells present in each farm's milk. These counts are done each month by the Department's mastitis unit at Glenfield and are known as the Bulk Milk Somatic Cell Counts (BMSCC).

BMSCCs are supplied to individual farms for use in their on-farm mastitis programs. An estimate of the amount of milk production lost through mastitis is also provided. Herds with mastitis problems are offered assistance by veterinary officers, veterinary inspectors and livestock officers (dairying).

The State BMSCC average is used to monitor the success of the mastitis control program. Advisory material is produced for local media releases, newsletters and field days.

When somatic cell counting first started in 1975, the State BMSCC average was 511 000 cells/ml of milk. In March 1987, the State BMSCC had fallen to 370 000 cells/ml; it continued to fall to 292 000 cells/ml in March 1988. This represents savings to the industry of over $1 million a year due directly to the Department's Mastitis Advisory Program.

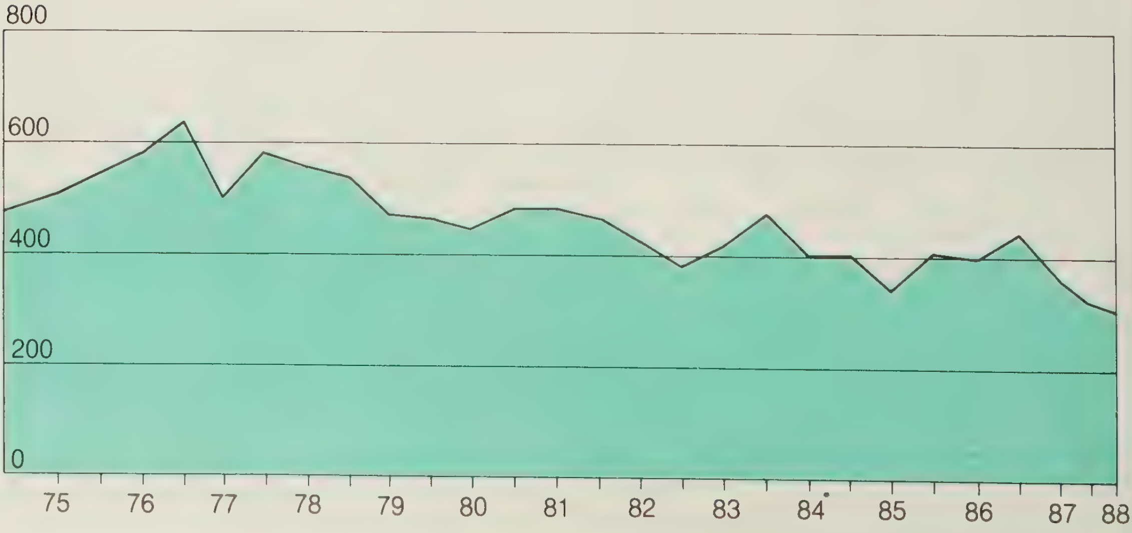
Enzootic Bovine Leucosis. Following a survey of NSW dairy herds by the Department, Enzootic Bovine Leucosis (EBL) was recognised as a problem in some herds. Investigations are now in progress to establish the most economical methods of eradicating this disease. Eight herds with varying degrees of infection have been chosen for study.

Herd owners have been given a number of different management options said to reduce the spread of EBL. The options which best suit individual farms are chosen by the herd owners, and the EBL status of those farms will be monitored over the next three years.

PIG HEALTH

Atrophic rhinitis. Surveys and field investigations indicate that progressive atrophic rhinitis (AR) is not widespread in NSW. Only two per cent of a random sample of breeding herds proved positive in mid 1987. Of about 2500 breeding herds in NSW, six herds have now been confirmed infected and another four herds are suspect. In most cases infection has been linked either directly or indirectly to introductions from infected herds in South Australia and Victoria. Fortunately none of the infected herds is currently selling breeding pigs so the risk of spread from these herds is minimal. The financial impact of the disease in different herds has varied. In one infected

6-monthly state BMSCC av. 1975–1988



piggery of 130 sows, AR has been estimated to have cost $12,000 in extra medication costs and reduced growth rates over the past 12 months but in others the cost has been minimal.

The use of artificial insemination has been promoted as a positive step to reduce the entry of infectious diseases such as AR. When producers still wish to introduce live pigs they are being encouraged to purchase only from herds free of AR.

Enteric diseases. Most field and laboratory investigations in pigs have centred on enteric diseases. The availability of effective vaccines for pre-weaning and post-weaning colibacillosis has facilitated control of these diseases in piggeries. With the imminent release of a swine dysentery vaccine, campylobacteriosis will be the only major enteric disease for which an effective vaccine is not available. Departmental, Pastures Protection Board and private veterinarians have assisted with field trials to evaluate the efficacy of all these vaccines.

Enzootic pneumonia. Enzootic pneumonia is a chronic respiratory disease of pigs caused by *Mycoplasma hypopneumonia*. It is probably the most important animal health condition of intensive piggeries. To date, the only means of effective control has been by the use of antibiotics. A major task at the Central Veterinary Laboratory, Glenfield, is the development of a vaccine and an ELISA test for field diagnosis.

POULTRY HEALTH

Salmonella Pullorum Disease Control Program. Since a national outbreak of pullorum disease in 1965, considerable effort has been directed towards eradicating this very costly disease from commercial poultry flocks. This effort has been coordinated by a National Pullorum Disease Control Program which has been successful in eradicating pullorum disease from commercial chickens and in ensuring safe movement of day-old chickens and fertile eggs between states and overseas. A recent aim has been to reduce the level of monitoring required by commercial poultry companies whilst still maintaining flocks free of this disease.

Some changes have been made to the program, the most significant being that after two years of monitoring, parent-level flocks (which form a large part of the breeding hierarchy) will no longer need to have annual tests. This will result in savings to the commercial poultry companies.

NSW Agriculture & Fisheries also examined the question of day-old chickens coming into NSW. Owing to the absence of isolation of *Salmonella pullorum* in NSW for some years, the Department no longer requires that day-old chickens entering NSW be from approved pullorum-free hatcheries. This will reduce the time spent by state border crossing inspectors and interstate hatcheries in ensuring that consignments of chickens are properly documented. It is hoped that other states will follow NSW's lead in this area.

Exotic disease prevention. The Department has begun an inter-regional advisory program aimed at reducing the risks of the introduction of exotic Newcastle disease and avian influenza into NSW poultry flocks. Surveys conducted in Australia indicate that avian influenza virus is present in wild birds, especially waterfowl. Two outbreaks of Avian Influenza have occurred in Australia; the 1985 outbreak in Bendigo cost $2 million to eradicate. The probability of another outbreak is reasonably high if the major source of infection—waterfowl on poultry farms—is not reduced.

The first step in this advisory program was to gather information on the extent of wild bird contact with poultry farms. Questionnaires were mailed to all poultry farmers in NSW; 40 per cent were returned. Valuable information was obtained from this questionnaire. The following points are considered to be of particular importance:

- Nineteen per cent of all poultry farmers draw at least some of their birds' drinking water from dams. Most of these dams are frequented by wild ducks and other species of waterfowl. Only 20 per cent of this dam water is sterilized before being given to poultry.
- Nineteen per cent of all poultry producers have waterfowl grazing within 30 metres of the their poultry sheds.
- Ninety-five per cent of all poultry meat producers indicated that their sheds were bird-proofed compared with 60 per cent of egg producers.
- Five per cent of all egg producers had some domestic ducks on the farm which had access to layer sheds.

The next stage of this advisory program is to inform producers of the exotic disease risks associated with these practices.

Flock layer health. The inter-regional advisory program in the previous section also aimed to increase productivity in poultry layer flocks by improving flock health. This will be achieved by looking systematically at all aspects of disease control and advising egg producers of areas where improvements can be made. Information about important areas of disease control was collected in the questionnaire mentioned in the previous section. Significant findings are listed:

- Twenty-three per cent of all layer farms had only single-age-group sheds. The remaining farms had at least one shed which contained more than one age group of birds. It is considered that multiple-age-group sheds allow disease agents to remain.
- The overall use of antibiotics in both pullet rearing and egg production enterprises was acceptable. However, the survey indicated areas for improvement.
- Sixty-six per cent of egg producers needed to spray their birds for external parasites (northern fowl mite or lice) during the last 12 months. This is an area for concern about pesticides.
- Of the 32 pullet producers who responded, only 15 were completing a full vaccination program. This demonstrated a need to consider whether failure to vaccinate results in production losses.

The advisory program aims to follow up these areas and to advise producers on methods to improve the health of layer flocks and hence reduce the cost of egg production.

Infectious laryngotracheitis (ILT). The infectious laryngotracheitis (ILT) outbreaks that started in the outer metropolitan area of Sydney in August 1986 persisted at a low level until escalating in July 1987. This was the first large-scale outbreak of the disease in NSW since 1971. The outbreak highlighted the vulnerability of the chicken meat industry to a disease which may kill up to 70 per cent of a flock.

The course of the disease in a flock is usually 10 to 14 days. Death is caused by asphyxiation through inflammation of the airways. The disease affects chickens and pheasants.

ILT is preventable by vaccination. However, the current ILT vaccine (SA2) is unsatisfactory when given to young broilers, particularly when mass vaccination techniques are used. Mortalities from vaccination may reach five to six per cent. Losses from vaccination alone during the 1986–87 outbreak cost the industry around $1 million.

The financial losses associated with ILT vaccination of broilers in practice excludes the strategic use of SA2 in broilers except in emergencies. Thus a large proportion of the susceptible population remains unprotected against a disease that occurs periodically and unpredictably.

The erratic spread of ILT experienced in 1986–87, combined with the unpredictable occurrence in different geographical locations, demonstrates the acute need to find a safer ILT vaccine. The specific aim of the project that began in early 1987 is to evaluate the safety of and the protection afforded by three other ILT virus isolates.

In extensive trials conducted during 1987, one of the three ILT virus isolates proved to be significantly safer and gave the same protection as the current vaccine when given to one-week-old broilers.

Further work is now under way to evaluate the performance of this isolate in different strains of broilers, in different age groups and by different routes of administration. Of particular interest is administration of the vaccine in drinking water.

The project is funded by the Chicken Meat Research Council and Poultry Council in cooperation with Arthur Websters Pty Ltd and Steggles Pty Ltd.

The health of prawns is one aspect of the work of the Veterinary Research Officer (Fish Diseases).

GOAT HEALTH

Caprine arthritis-encephalitis virus (CAEV) infection is widespread in NSW with a high incidence in dairy goats. It has been suggested that infected goats perform poorly. However, there is no precise information available to date on the economic impacts of CAEV infection, the accuracy of detection methods for infected animals or the success of management in controlling spread of the disease.

Field and laboratory officers in the Division of Animal Health began collecting herd management information from goat owners and testing blood samples using the ELISA test. The aim is to provide accurate information about the disease. The project has not finished, but has already provided valuable information on the accuracy of laboratory techniques in detecting infected goats.

A scheme to accredit goat flocks free from CAEV infection began. This scheme was developed in consultation with goat producer groups. The Division of Animal Health maintains registers of accredited flocks and approved veterinarians participating in the scheme. The benefits of the scheme have been evident: sales of goats overseas from accredited flocks have been greatly facilitated. Owners have benefited also from increased value of sales within NSW and from improvement in productivity from the eradication of this disease from their flocks.

FISH HEALTH

Through the Regional Veterinary Laboratories, the Department provides a disease diagnostic service to the aquaculture industries, the commercial fishing industry and, in compliance with federal quarantine regulations, to importers of ornamental fish. It is also involved in research into significant diseases of fish in NSW.

Diagnostic activities included investigations into mass mortalities of hatchery-reared, larval marine prawns, monitoring of QX disease in cultured Sydney rock oysters and examinations of diseased ornamental fish held in quarantine by licensed importers. Several significant fish kills were investigated, and monitoring continued on the Tweed River where major kills last year were associated with toxic aluminium concentrations and very low pH in the water.

Continued research into Red Spot disease in estuarine fish on the Clarence and Richmond Rivers has suggested that typical cutaneous ulcers develop after floods, when susceptible fish are exposed to water with a very low pH and a low oxygen concentration. Other research demonstrated the marked susceptibility of some salmonid species to infection by *Aeromonas salmonicida*, the agent of goldfish ulcer disease, which is endemic in NSW. In order to develop expertise and to increase the involvement of the Department in fish disease matters, the position of Veterinary Research Officer (Fish Diseases) has been established at the Regional Veterinary Laboratory, North Coast Agricultural Institute, Wollongbar.

BEE HEALTH

Since the completion of the work on the use of gamma radiation in the control of American foulbrood (AFB), 45 000 hive boxes have been irradiated in Australia. Much of this equipment, valued at $1 million, would have been burned if the use of gamma radiation had not been developed.

A three-year project investigating various aspects of the major bacterial bee diseases was completed. One of the major findings of this project, which was supported by the Honey Research Council, was the development of an ELISA test to detect inapparent AFB infections. This technique has a useful application in detecting AFB-infected hives that have had disease signs masked by antibiotic treatment. It has a wider application in that it can be used to determine the AFB carrier status of hive populations in any beekeeping area.

The use of this test and an examination of diagnostic submissions received by the Regional Veterinary Laboratories in this State

Deer being tested for TB whilst in quarantine.

Examining one of the European entrants in the International Tancred Stakes, at the Eastern Creek Animal Quarantine Station.

indicated that AFB is endemic in NSW and that when conditions are favourable, such as in spring or when hive populations build up, the disease status changes to epidemic.

LIVESTOCK REGULATORY SERVICES

ANIMAL QUARANTINE AND LIVESTOCK EXPORTS

As the agent for the Commonwealth Department of Primary Industries and Energy, NSW Agriculture & Fisheries implements animal quarantine policy within NSW and supervises preparation of animals for export overseas.

Export of livestock and genetic material. Export Control (Animals) Orders under the Export Control Act 1982 were signed by the Federal Minister and became effective on 1 October 1987. These Orders, which replace Part VIII of the Quarantine (Animals) Regulations, are specifically designed for the control of exports of live animals and animal reproductive material.

The Department provides the operational and field services and is responsible for supervising the preparation of animals and liaison with exporters and the veterinary profession. Appropriately authorised officers in the states are responsible for the issue of Permits to Export as required by the Orders. Authorised veterinary officers are responsible for the issue of Section 23 Certificates of Health as authorised in the Act.

The Department continues to provide resources and acts as the agent of the Commonwealth in the collection and management of fees.

Importation of deer from New Zealand. The temporary ban on the importation of deer from New Zealand was lifted. Revised conditions, as well as the requirements for private premises for post-entry quarantine in Australia, were received. These new conditions include extra tests in the quarantine periods to cover the risk of importing deer infected with the nematode *Elaphostrongylus cervi.*

The first consignment of 19 deer imported under the revised conditions underwent 100 days of post-entry quarantine in approved, privately owned quarantine premises at Parklea on the outskirts of Sydney. A second privately owned quarantine facility has been approved at Scone and a permit has been issued for the importation of 200 deer in the first shipment.

During the year approval was given for importation of deer semen and embryos from New Zealand.

Importation of queen bees. Varroa jacobsoni, mites causing varroasis, and *Braula coeca*, bee louse, were found infesting escorts of five queen bees during post-entry quarantine. The bees were imported from Austria and Poland.

All imported bees and materials were destroyed and disinfection measures were undertaken in the bee quarantine facility at Eastern Creek Animal Quarantine Station. This is the first interception of *V. jacobsoni* in Australia. *B. coeca*, although reported from Tasmania, does not appear to occur on the mainland.

Horses imported from the UK and France for the International Tancred Stakes. The normal import requirements for horses from these countries were adapted to enable these horses to be kept in competition condition during quarantine by providing training facilities in quarantine stations (both overseas and in Sydney) and by the addition of seven days of quarantine isolation. The requirement for testing for contagious equine metritis (CEM) during this isolation period was omitted as these racehorses were not involved in any breeding program whilst in Australia.

The quarantine after arrival in Australia was 14 days at the Eastern Creek Animal Quarantine Station, Sydney. During the second seven days of the 14-day quarantine period, following health clearances they were permitted to visit Rosehill Racetrack for training in isolation from other horses not undergoing a similar quarantine program, under the direct supervision of an Australian quarantine officer.

The horses were released from quarantine on 23 March 1988, raced on 26 March and flew out of Sydney on 30 March.

This is the first time that such an international horse race has been held in Australia and the efforts and cooperation of the Sydney Turf Club are to be commended, as this event created a tremendous amount of interest. The benefits to the Australian Racing Industry could be quite significant.

Export of live slaughter cattle to Japan. During the year the Japanese authorities advised that residue testing for live slaughter cattle imported into Japan from Australia would be undertaken. This action resulted in additional certification for slaughter cattle exported to Japan. This included certification that:

- the cattle came from properties with no history of detection of organochlorine residues
- all feedstuffs offered to the cattle during preparation were batch tested for organochlorine residues with negative results
- each lot of cattle prepared for export to Japan tested negative for organochlorine residues by fat biopsy technique at the rate of 1:50.

VERTEBRATE PEST CONTROL

Wild dogs. The use of fixed-wing aircraft for aerial bait distribution was prohibited in 1987 in the Central and Eastern Divisions. The more accurate bait placement by helicopters, coupled with better access to restricted problem areas, has led to a considerable reduction in stock losses following the 1987 baiting program.

All state agriculture departments and organisations now have wild dog control policies in place as a result of the Review into Wild Dog Control in Eastern NSW. The National Parks and Wildlife Service released its draft policy on aerial baiting procedures at a series of meetings along the Tablelands early in 1988.

A State wild dog control plan is in the final stages of preparation.

Feral pigs. Helicopter culling of feral pigs has been employed by two more Pastures Protection Boards in the North West of the State. Eleven Boards in Western NSW now use this control method.

The development and testing of the support plan for the control of an exotic disease in feral pigs is now complete. The plan is being used as a model by the Department of Primary Industries and Energy for other vertebrate pest species in Australia. Field evaluations of the plan and its associated control strategies have revealed that the anticoagulant poison warfarin is very effective against feral pigs.

Procedures to allow the use of warfarin for use against feral pigs began.

Rabbits. An alternative poison to 1080 has been registered for use against rabbits. The anticoagulant pindone will be available to landholders through Pastures Protection Boards. Pindone has some disadvantages compared with 1080 but it will have special application in closely settled areas where 1080 is not permitted. A State rabbit control plan is being drafted.

Training. Three legal training courses were conducted in collaboration with the Chief Legal Officer. A four-day vertebrate pest control course was conducted for staff of Pastures Protection Boards, the National Parks and Wildlife Service and the Forestry Commission. The National Parks and Wildlife Service contracted the Special Livestock Officer (Vertebrate Pests) and Livestock Protection Officer in Dubbo to conduct a three-day vertebrate pest control course for its Western Division staff.

Plague locust control. In the spring of 1987 the Department, the Australian Plague Locust Commission (APLC), Pastures Protection Boards and landholders mounted a successful control campaign against a serious outbreak of Australian plague locust.

One thousand and twenty-five landholders in the upper Hunter, North West and Central West reported hatchings. A total of 23 813 litres of fenitrothion insecticide were issued to landholders for hopper control.

The Department, in conjunction with Pastures Protection Boards, carried out aerial swarm control in the Baradine, Come-by-Chance, Condobolin and Narrandera Pastures Protection Districts. A total of 8151 litres of technical fenitrothion insecticide was used.

The APLC carried out aerial control in the Broken Hill, Wilcannia, Bourke, Brewarrina, Walgett, Nyngan, Condobolin and Hillston districts using a total of 47 501 litres of technical fenitrothion insecticide.

PASTURES PROTECTION

Abolition of Wild Dog Control Boards. As from 1 January 1987 the State's Wild Dog Control Boards were abolished. The four Boards were largely responsible for coordinating the control of wild dogs, particularly by aerial baiting. With the abolition of the Wild Dog Control Boards this function was taken over by individual Pastures Protection Boards on the Coast and Tablelands. The changeover proved to be very effective and the new role has been assumed without any problems.

Pastures Protection Boards publicity. At the 1987 Australian National Field days at Orange the Pastures Protection Boards conducted their annual display. The emphasis on animal health matters and the housing of the display in the new building, largely financed by a departmental grant, contributed to the vastly increased number of people visiting the display.

Working Party on minimum rates. Because of the increasing subdivision of rural land there is an ever increasing number of landholders who are required to pay the appropriate minimum rates to their local Pastures Protection Board. There are over 111 000 ratepayers to the Boards in the State and of these over 52 000 pay the minimum rates.

Because of the increasing numbers of hobby farmers and others who are the occupiers of small holdings, a Working Party was established to review the basis on which Boards assess minimum rates. It is anticipated that the outcome of the Working Party's investigation will bring more rating equity for landholders with small areas. The activities of the Working Party will take several months. Any variation to the present rating system would not be effected before the 1989 rating year.

Results of sampling of meat destined for domestic market, 1987

Species	Meatworks sampled	Samples taken	Residues detected above accepted level				
			Heptachlor	Dieldrin	DDT	BHC	Oxychlordane
Cattle	51	5731	3	11	2	1	3
Pigs	39	866	0	3	0	1	0
Sheep	37	1088	0	0	0	0	0
Poultry	24	489	0	3	0	0	0

Working Party on Western Division Pastures Protection Boards. During 1983–84 there was an extensive review of Pastures Protection District boundaries. However, owing to a Joint Parliamentary Committee of Inquiry into the Western Division being conducted at that time, there was no investigation into the boundaries of Pastures Protection Districts there.

The present structure and function of Pastures Protection Boards in the Western Division has remained essentially unchanged for many years. It is now considered timely to conduct a review of the Western Division Boards and a Working Party has been established to do this. This review will take several months to complete.

Review of travelling stock legislation. In 1983 a Working Party was established to review the travelling stock legislation in this State. The Working Party comprised representatives from Pastures Protection Boards, the Department of Agriculture, the Shires Association, the Police Stock Squad, the NSW Farmers' Association and other interested parties. The review was quite complex owing to strongly divergent opinions from the various organisations and individuals around the State. The review has now been completed and draft proposals are contained in a report prepared by the Chairman of the Working Party. The draft proposals incorporate new features which will improve the efficiency of stock movements and make it more convenient for people engaged in the movement of livestock. They also place a greater emphasis on the control of walking stock which will improve road safety on travelling stock routes.

CHEMICAL RESIDUES

The State monitoring program was altered to concentrate on sampling at domestic meatworks, leaving the Commonwealth to monitor export works.

The table summarises the results of testing.

Considerable resources were diverted for field investigation, and associated laboratory support, of the source of residues, and the management of affected properties. Fourteen piggeries and 261 cattle herds were detained by the end of 1987. The laboratories analysed samples from 650 properties.

DOMESTIC MEAT STANDARDS

There was a further increase in the registration of poultry processing plants from 140 to 150, mainly as a result of the expansion of further processing of smallgoods and prepared convenience meals.

STOCK MEDICINES

The Stock Medicines Section considered 330 new product applications in 1987–88 and processed 1756 re-registrations.

Stock Foods and Medicines Amendment Act 1987. Regulations have been written in conjunction with industry and the Australian Veterinary Association to support the amendments to the Stock Foods and Medicines Act 1940. These regulations have yet to be proclaimed.

One significant addition to the Regulations is the control of unregistered chemicals in research and development to prevent the entry of harmful chemicals or biologicals into the food chain.

Proposed Commonwealth legislation. Legislation has been drafted for the Commonwealth's Agricultural and Veterinary Chemicals Bill. This Bill was presented at the autumn session of Parliament in 1988. The purpose of the legislation is to give a legislative base to the clearance of agricultural and veterinary chemicals.

Testing of stock medicines. The Stock Medicine Analyst continued tested Stock medicines on a random basis. Random testing of anthelmintics, vitamin supplements and anabolic steroids were also tested. The National Biological Standards Laboratory tested vaccines and antibiotics.

Unregistered products. Legal action has been taken against one company on eight counts of selling unregistered stock medicines.

Horses as food-producing animals. Our growing trade in horsemeat has resulted in horses being recognised as food-producing animals. Products for use in horses which have residue implications will be referred to the Technical Committee on Veterinary Drugs for clearance.

NATURAL DISASTER RELIEF

During the year parts of the State experienced drought and floods. Bushfires were not a major problem. With the assistance of Pastures Protection Boards, the Department administered the payment of 50 per cent road transport subsidies on movements of water, fodder and livestock, necessitated by these disasters.

Up to 39 of the State's 57 Pastures Protection Districts were drought-declared at some time during the year. Expenditure on drought relief road transport subsidies was $3.7 million.

During April fodder was airlifted by the RAAF to livestock marooned by the flooded MacIntyre River near Goondiwindi. A 50 per cent subsidy, to a maximum of $3.00 a bale, was available for the purchase of hay by stockowners to feed stock on properties affected by the floods in the Goondiwindi and North Coast areas.

The Government (Rural) Agencies Section of the State Bank of NSW also assisted with loans. Expenditure was $10.1 million.

SNOW ON SOUTHERN TABLELANDS

In late July the heaviest snowfalls in the Southern Tablelands since 1949 prompted coordination of relief efforts by the Department and Pastures Protection Boards involving the Forestry Commission, Soil Conservation Service, Snowy Mountains Authority, local councils and contractors.

The stress to the 130 000 sheep at risk over the 60 000 hectares affected was compounded by their weakened condition at the end of a 13-month drought. Farmers were unable to move about their properties to feed their sheep because of the deep snow which remained on the ground for two weeks.

Heavy equipment was used to clear roads and tracks to the stock so that hay, either held on properties or rushed to the district, could be delivered to the sheep. The tireless efforts of all involved enabled all sheep to be fed within a few days. Over the 10 days of the crisis 50 000 bales of hay were fed to the stranded sheep.

Lambs born during the snowfalls perished and some individual properties lost up to 15 per cent of ewes. The efforts of all associated with the relief operation kept overall stock losses to a minimum.

The Snowy Mountains Authority helicopter and fixed-wing aircraft were used to drop hay to sheep inaccessible any other way and for reconnaissance of the areas.

REGULATORY PROGRAMS

BOVINE BRUCELLOSIS

The Brucellosis and Tuberculosis Eradication Campaign has been highly successful in NSW. Freedom from brucellosis was declared on 1 January 1988. This is well ahead of the national 1992 target.

The final stages of herd testing have not revealed any major disease breakdowns. NSW cattle herds will be assessed by abattoir monitoring and milk ring testing for a further five years to ensure that no residual pockets of infection exist.

On 1 January 1988, movement testing requirements were introduced for all cattle entering NSW from areas of lesser disease status. A negative brucellosis test is required for all breeding cattle over six months of age. This has proven to be very worthwhile in maintaining brucellosis freedom in NSW.

The cattle industry in NSW has put a great deal of effort into achieving brucellosis freedom. All cattle in NSW have undergone at least three tests. Abortion storms due to brucellosis are a thing of the past, and farmers and meat workers are no longer threatened by the possibility of contracting brucellosis while at work. Along with helping to maintain profitable overseas markets, these factors all help to justify completion of the eradication campaign Australia-wide.

Examination for TB of suspect beast in the Macquarie Marshes.

BOVINE TUBERCULOSIS

The Brucellosis and Tuberculosis Eradication Program operates nationwide. The target is to eradicate tuberculosis from the nation's cattle herds by 1992.

NSW has progressed well in achieving this aim and was declared Impending Free of tuberculosis on 1 January 1988.

The Impending Free status denotes that freedom is fast approaching, but because of the insidious nature of the disease, is not guaranteed at this stage. If NSW can demonstrate in the next five years that all tuberculosis has been eradicated from the State it will be eligible to be declared free of tuberculosis.

Tuberculosis infection in cattle in NSW was isolated to the Macquarie Marshes, north west of Dubbo, early in 1987. Before this breakdown, no herds in NSW were known to be infected with tuberculosis. This was after an extensive eradication campaign that spanned more than 20 years.

The breakdown was detected from an animal slaughtered in an abattoir. It was traced back to the property of origin by the tail tag system.

Because of this one tuberculosis-infected animal a massive campaign was undertaken to ensure that tuberculosis could not spread further. Cattle reacting to the tuberculosis test were slaughtered and areas at risk of infection were destocked. In total over 11 000 head of cattle were tuberculosis tested and 6000 were destocked from the central infected area. Fifteen were confirmed to have tuberculosis; seven of these were wild, undomesticated cattle. This has meant that measures to ensure that no wild cattle are left in the environment were necessary. Two negative surveillances of the central area were required before restocking was allowed.

After the declaration of NSW as an Impending Free area of tuberculosis on 1 January 1988, movement requirements were placed on cattle entering NSW from areas of lesser disease status. This is to ensure that the disease is not reintroduced. All cattle over six months of age are required to be tuberculosis tested with negative results within 30 days of their movement into NSW. The only exception from this is for cattle consigned direct to abattoirs for slaughter which are transported in NSW in sealed trucks.

The tuberculosis eradication campaign has been very successful in NSW but requires diligence to maintain freedom from the disease.

CATTLE TICK CONTROL

Cattle tick is a parasite that transmits tick fever, which can cause high mortalities in cattle. Both cattle tick and tick fever are common in northern and eastern Queensland. Surveillance of stock movements across the border prevents introduction of ticks to NSW.

Queensland border. Scheduled tick lines in Queensland were relocated eastward removing large areas from restriction for movement into NSW. Legislation controlling movement of stock and materials was greatly simplified. Restrictions associated with the relocated tick lines were eased on 1 January 1988. Daylight surveillance has been introduced temporarily along the Tenterfield section pending final ratification. A computer program monitoring movement of stock and materials across the border was introduced.

Border staff supervised the concessional introduction of slaughter cattle to NSW abattoirs following the introduction of more stringent movement conditions for brucellosis and tuberculosis control in NSW.

Tick Quarantine Area. Cattle ticks in NSW are confined to the north east corner. They are endemic within the Tick Quarantine Area (TQA) where control is the major objective. A cooperative treatment program in the Currumbin Valley, a compulsory dipping program in the buffer zone along the Queensland border and a similar recommended program for the rest of the TQA have suppressed tick populations to very low levels. Compulsory examinations of all herds after the dipping season detect infested properties, which must then treat to eradicate the infestation.

Warm showery conditions in spring and summer were most conducive to tick survival and propagation. Despite this, with 70 per cent of herds examined only three tick infestations were detected. No cases of tick fever were reported for the fourth consecutive year. The pour-on acaricide Bayticol® Pour-on remains a popular alternative to dipping with no evidence of tick resistance detected in Queensland cattle.

Restrictions on the movement of stock and materials out of the TQA were simplified. All restrictions were removed from soil, grass, seed, turf, straw, sand, gravel and timber. Restrictions remain for hay and hides. Stock movement controls were eased in line with simplified restrictions from Queensland and a concession introduced for slaughter of TQA cattle at Grafton and Macksville Abattoirs following one clean treatment.

Within the TQA, movement restrictions were abolished except for stock moving off infested or adjoining properties, through saleyards or into areas under preparation for release from the TQA.

The North Tabulam area will be released from the TQA following the sealing of a new boundary line between the North Tabulam and Bonalbo districts.

Nineteen aboriginal trainees employed under a training scheme sponsored by the Commonwealth Government completed 12 months' instruction in all aspects of Inspector of Stock duties. Fourteen continued employment as temporary staff to complete the annual examination by June 1988.

Clean country. Properties outside the TQA where outbreaks of cattle tick occur are placed in quarantine and an eradication program is implemented. Forty-three properties remained in quarantine following an outbreak in 1986. Thirty-two of these were released from quarantine on 30 June 1988. One tick was found on stock grazing the Kangaroo Creek State forest which extended the quarantine on 11 properties and quarantined 12 new properties until June 1989. Eighteen properties are under treatment and a further 13 properties are under surveillance for examination and projected release in June 1989.

Prompt notification by a stud owner of cattle tick on a horse introduced from Queensland to Scone confined the quarantine to the stud of destination only. Eradication and surveillance should be completed by April 1989.

INTERSTATE MOVEMENT OF LIVESTOCK

A redesigned NSW health certificate was printed and supplies forwarded to all States. The simplified format of this certificate has substantially reduced the workload of interstate officers yet still supplies the required details for stock entering NSW.

The longstanding requirement for sheep to be certified free of lice for entry to NSW was removed. As all States have equal prevalence of lice little benefit was seen in continuing this requirement which has done little to reduce the prevalence of lice in NSW.

Because *Salmonella pullorum* has not been isolated from commercial poultry flocks or hatcheries for some years, freedom from pullorum disease was removed as a requirement for chickens and hatching eggs entering NSW.

Similarly the entry requirements for pigs into NSW were reviewed and modified with health certificates now only required for pigs entering NSW from Queensland, Western Australia and the Northern Territory on account of *Brucella suis*.

INTRASTATE MOVEMENT OF LIVESTOCK

Following the review of movement control on stock within NSW, Form 3 Permits for movement of pigs from saleyard to abattoir were abolished as was the Swine Movement Note system. This action was supported by pig industry representative groups. Inspectors at pig sales will now be able to redirect their activities to ensure producer compliance with swine branding.

A new system based on owner certification for cattle entering the Tick Quarantine Area was introduced. This system will significantly reduce the involvement of inspectors at a number of cattle saleyards in NSW and allow them to concentrate on more cost-effective activities.

EXOTIC DISEASE

Exotic disease preparedness. Major advances were made in 1988 in ensuring that the Department is able to respond effectively to an outbreak of exotic animal disease.

Exotic disease exercises in 1987–88

Date	Location	Staff involved	Disease scenario
September 1987	Bathurst	Region 4	Foot and mouth disease
December 1987	Sydney	Head Office	Foot and mouth disease
March 1988	Yanco	Region 5	Foot and mouth disease
March 1988	Dubbo	Region 3	Rinderpest
April 1988	Seven Hills	Region 2 and H.O.	Newcastle disease
June 1988	Wollongbar	Region 1	Rabies

The Department contributed to the development of a model code of practice for livestock transport.

The threat of such an outbreak is ever present and ever increasing with increased air travel and transport. A major exotic disease outbreak would have a devastating effect on Australia's economy.

During the year a NSW Exotic Animal Disease Control Manual was published. This manual contains detailed operational procedures which would be necessary to combat a disease outbreak.

Following the distribution of the Manual to relevant staff and outside bodies, a number of exercises were held to familiarise Regional and Head Office staff with the procedures set out in the Manual. Six exercises have been held as shown in the table.

These exercises represent a major investment in training by the Department. They have been very useful in preparing staff for their roles in an exotic disease outbreak. They have also revealed many areas where the Exotic Disease Manual can be improved. The production of a second edition of the Manual is proposed for 1988–89.

ANIMAL WELFARE

LEGISLATION

The Department's animal welfare responsibilities are primarily advisory with the aim of promoting good animal welfare practices.

Some legislative responsibility for animal welfare is contained in the Veterinary Surgeons Act 1986 but the principal legislation is the Prevention of Cruelty to Animals Act 1979. The Animal Research Act 1985 will, when proclaimed, control all aspects of the use of animals in research and experimentation.

In accordance with this latter Act the Department has established 14 Animal

Experimentation Ethics Committees for all of its animal research activities. All projects involving animals in research must be approved by the local committee.

The Department is represented nationally in preparing model codes of practice in animal welfare for the various livestock species and industries. Many of these codes have been completed and have been endorsed by the Australian Agricultural Council and many others are nearing completion. Completed codes are being promoted actively. Liaison with State and industry bodies has ensured that the Department remains in touch with animal welfare issues.

RESEARCH

The way in which stress resulting from routine farm husbandry procedures can influence the welfare of livestock and their productivity and product quality is being investigated. New techniques for measuring hormones, for example in saliva, have been developed along with a form of psychological testing which measures the cognitive response of sheep to stress.

Surgical procedures have been shown to result in an acute stress response which includes the release of beta-endorphin, a pain relieving hormone.

Recent research shows that changes in plasma hormone ratios may be of value in distinguishing acute stress (of short duration) from more prolonged or chronic stress lasting several days.

These techiques should also be useful for assessing the degree of pre-slaughter stress in cattle and finding ways to minimise the problem of dark cutting meat.

A high profile has been given to the welfare needs of animals on-farm, during transport and in saleyards and abattoirs. This has resulted in contact with a wide cross-section of industry. Some achievements in this area include contributions to the Saleyards Code of Practice, the Livestock Transport Code of Practice, the Interstate Commission on Livestock Transport's investigation into road vehicle volumetric loading and requests from a number of councils for assistance in saleyard design and modification. A close working relationship has also been developed with the Animal Welfare Division of Local Government.

INFORMATION MANAGEMENT

The Department approved the development of an Animal Health Information System known as Vetlink. Specifications for the system were completed and a contractor was selected to design the system. The production of up-to-date laboratory, abattoir and field disease reports will be a feature of the system which will also produce specialised, one-off disease searches of individual properties, areas or the whole State. Vetlink has been designed to identify significant disease events, to provide information to be used in establishing priorities for animal health programs and to evaluate programs.

The Department significantly upgraded its computerised systems used to manage information on chemical residues in livestock. The management of laboratory and field data on residues and the reporting of results was upgraded.

Computer links were established with the Department of Primary Industries and Energy (DPIE) in Canberra. The Department's AGNET computer system has quickly provided details of chemical residue findings to field veterinary staff. This has enabled quick action to be taken on affected properties.

The database to manage information on Animal Health publications was upgraded. This enabled the monitoring of authorship, the updating of information, and the ready retrieval of published material in response to producer and field staff inquiries.

FISH INDUSTRIES

Fish and their habitats are common property resources owned by the people of NSW and managed in trust by the Government. No single individual or group has a right to exclusive use of these resources.

The Minister for Agriculture and Rural Affairs has the responsibility under the Fisheries and Oyster Farms Act to protect, develop and regulate the fisheries of NSW. The Department is responsible for efficiently and effectively administering and enforcing the Act, implementing government policies in relation to fisheries and the fishing industry and conducting research to assist in managing fish populations and their habitat.

Most fisheries management, like all natural resource management, is a process of allocation between competing users. Regulation and administrative procedures are established to allocate the resource (fish and habitat) equitably between users, to avoid conflict and to respond to society's changing needs and wishes.

The Department has four operational fisheries programs: Marine Fisheries Research and Development, Marine Fisheries Regulation and Management, Inland Fisheries Research and Development and Inland Fisheries Regulation and Management.

MARINE FISHERIES REGULATION AND MANAGEMENT

The NSW State Government directly manages the marine fisheries in State waters, which extend offshore for three nautical miles, and participates in cooperative management of the fisheries in Commonwealth waters from three to 200 nautical miles off the coast.

MANAGEMENT COMMITTEES

NSW is represented on three management advisory committees with the Commonwealth. These are the East Coast Trawl Management Advisory Committee, the South East Trawl Management Advisory Committee and the East Coast Tuna Management Advisory Committee.

During the year an interim management plan for longline tuna fishing was developed in conjunction with the Commonwealth. Fishermen who can demonstrate that they have a history of fishing for tuna (various species) by longline will be endorsed to operate in this fishery. Applications for endorsement in the fishery are being evaluated by a joint State-Commonwealth working group.

Within the South East Trawl fishery, the Commonwealth introduced a total allowable catch (TAC) of 3000 tonnes for gemfish (*Rexea solandri*) in early 1988. NSW took a strong stand to protect the interests of its fishermen who might have been disadvantaged by such a system and, more importantly, by future developments in management.

Once a TAC has been established, individual quotas are usually introduced. Normal practice is to allocate these quotas on the basis of past catch history. There is some reluctance on the part of the Commonwealth to make a commitment to use catch history, but unless this is done then NSW fishermen face losing over 60 per cent of their traditional gemfish catch.

OFFSHORE CONSTITUTIONAL SETTLEMENT (OCS)

Negotiations to establish an agreement for the jurisdiction and management of the fisheries which span both Commonwealth and State waters have continued for several years. The OCS has not been finalised because of concerns over South East Trawl arrangements and jurisdictional boundaries for the dropline and trap fisheries.

AQUATIC RESERVES

Towra Point Aquatic Reserve was gazetted in December 1987 after extensive public consultation. This reserve protects an outstanding estuarine and wetland area at the south end of Botany Bay.

Investigation of the proposed Solitary Islands Marine Park continued. The value of this area was recognised when a Commission of Inquiry recommended relocation of a proposed sewage outfall away from the area.

ESTUARINE FISHERIES MANAGEMENT

With the exception of the Tweed, Clarence and Richmond Rivers, all estuaries north of Coffs Harbour were closed to commercial netting for finfish to reduce conflict with recreational fishing. The effect of these closures will be evaluated as part of a research program into estuarine fish stocks and the impact of commercial fishing on fish populations and their habitat.

An interim management plan for prawn trawling was introduced for the Clarence, Hunter, Hawkesbury, Port Jackson and Botany Bay estuaries. Under the plan only those fishermen who have historically trawled in the estuaries may continue to do so. New fishermen will not be able to enter the industry unless they purchase an existing vessel. The

The wetlands and estuaries along the NSW coastline are a valuable fisheries resource, requiring careful management and protection.

Dave Rogers

Dave Rogers

New prawn fishery management plans were announced for the Clarence and Hunter Rivers and the Port Jackson, Botany Bay and Hawkesbury inlets.

plans will be extensively reviewed at the end of five years, when biological studies are completed.

ABALONE

The large-scale poaching of abalone (*Halotis ruber*) continues and as a result stocks appear to be declining. Protection and management of this resource is expensive and difficult because of the scattered nature of the abalone, the high prices obtained on the black market, and the ease with which it can be sold. There are currently 45 licensed commercial divers.

The sashmi export market has expanded in recent years.

SHARK MESHING

The shark meshing program to protect 50 beaches from Newcastle to Wollongong continued with each beach meshed at least 13 times each month from September to April. The total annual cost for the four contractors involved in the program was $315,000.

COMMERCIAL FISHERIES ADVISORY COUNCIL

The Minister agreed to establish a Commercial Fisheries Advisory Council for NSW. The Council will represent the industry and advise the Minister on all commercial fishing matters in NSW. All licensed fishermen were consulted on the proposal and two documents were circulated for comment. Final details for the introduction of the council are being worked out with industry representatives.

RECREATIONAL FISHING ADVISORY COUNCIL

The Recreational Fishing Advisory Council (RFAC) is a forum for representatives of major State recreational fishing organisations and associations. RFAC is responsible for advising the Minister on matters of concern to recreational fishermen, and is constituted under the Fisheries and Oyster Farms Act 1935.

Council is made up of representatives of the Institute of Freshwater Anglers, the NSW Fishing Clubs Association, the NSW Division of the Australian National Sportfishing Association, the NSW Game Fishing Association and the NSW Division of the Australian Underwater Federation. In November 1987, the North and North West Amateur Fishermen's Association and the South West Anglers' Association were invited to send observers to Council meetings; new legislation will admit them to full membership.

Council meets quarterly, both in closed session and with the staff of the Division of Fisheries. Council discussed a number of topics, including:

- the closure of roads and paths to traditional fishing spots
- professional game fishing to the detriment of game fishing tournaments which encourage tourism in coastal towns

Recreational angling is the State's largest outdoor pastime.

- the involvement of fishing clubs with the tag and release program conducted by the Department's Fisheries Research Institute
- the effects on the amateur where angling is to be banned for the benefit of an aquatic reserve.

Council advised the Minister and NSW Agriculture & Fisheries on the formulation of policies and regulations in these areas.

A sub-committee of RFAC, the Fishing Clinics Committee, held two children's and two adults' fishing clinics during the year, teaching fishing skills with an emphasis on safety and ethics.

LAW ENFORCEMENT

Law enforcement is a key management tool for the State's fisheries. The number of Fisheries Inspectors remained at 92.

A new 11 metre offshore fisheries patrol vessel, FPV *Hunter*, was launched in January 1988 and is based in Newcastle. *Hunter* joins a fleet of offshore patrol vessels which monitor State and Commonwealth fisheries off the NSW coast. Longline and illegal netting offences have increased in offshore areas and the implementation of the OCS and gemfish quota will mean an increasing demand for these vessels in the future. Another offshore patrol vessel, the FPV *Wagonga*, was launched in June 1988 and is based in Narooma.

Surveillance was maintained on fish markets for consignments of undersized fish and prohibited species. The Market Evasion Squad gave particular attention to protection of the abalone industry. In one seizure resulting in court action, 520 kg of unprocessed black lip abalone was found in a restaurant.

Over 2100 offences were referred to the Court for determination during the year and 280 penalty notices (on-the-spot fines) were issued.

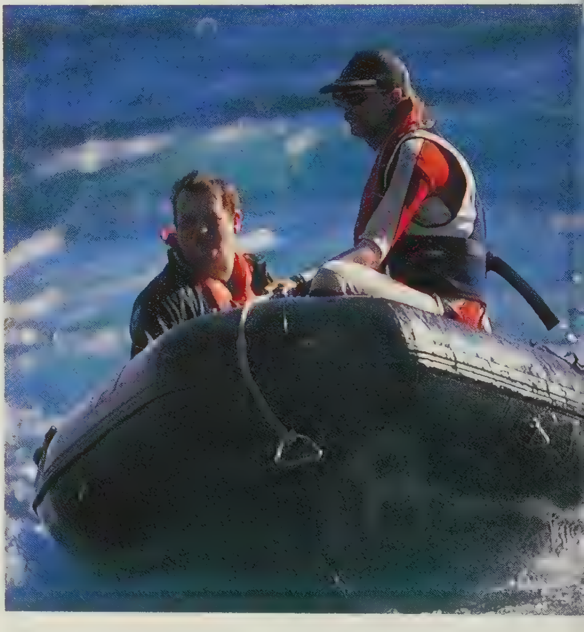
COMMERCIAL FISHING LICENCES

A new computerised licensing and catch statistics system was inaugurated in November 1987. The new licensing procedures will operate similarly to the driver's licence system. Fishermen will be automatically sent renewals for their boat and fishermen's licences. They will no longer be required to fill in complex renewal forms but, provided no details have changed, will simply have to sign the application and return it. Provision is available for an individual's State and Commonwealth licences to be adjusted to fall due on the same date each year.

The use of the new system will result in a significant increase in the timeliness and accuracy of catch data. Fishermen's catch returns will be entered directly onto the computer, rather than being held for 12 months as happened previously. This will enable up-to-date summaries of catches by areas and species to be rapidly produced. It will also enable fishermen's returns to be crosschecked against Cooperative receipts to ensure accuracy of the data.

The importance of accurate catch and effort data to both fisheries management and research cannot be overemphasised. The introduction of this system has resulted in a blitz on submission of catch returns and already over 30 fishermen have been fined for failing to submit returns.

Fisheries inspectors on patrol.



Costing over $200,000 the system is expected to become fully operational during 1988–89 but has already resulted in an improved service to fishermen and field staff who have access to the database through the Department's computer network.

The professional fishermen's licence freeze continued and the number of licensed fishing boats in NSW remained constant at 3400, 900 of which are also licensed to take fish in Commonwealth waters. There are 2800 licensed NSW fishermen, 1300 of whom have a Commonwealth licence. There is no restriction on the sale or transfer of licensed boats between licensed fishermen.

LEGISLATION

In response to an increase in black-marketing of fish in NSW, the Fisheries and Oyster Farms Act was strengthened by an amendment requiring the maintenance of detailed records concerning the acquisition, sale and possession of fish. The amendment will protect the interests of the consumer by allowing traceback of contaminated fish; it will also help curtail the increasing incidence of recreational fishermen selling their catch. This latter problem is reaching the stage where de facto commercial fishing operations are developing.

Records must be kept where more than 10 kg of fish fillets, 25 kg of whole fish, 10 kg of prawns, 3 kg of crayfish and 2 kg of abalone are held. Recreational fishermen who catch and keep fish are not affected. Restaurants, fish processors, fish retailers, clubs and hotels who are involved with selling fish, and who would normally be expected to keep such records for normal business purposes, will be targeted by this legislation.

A major media campaign with the theme 'Take only what you need' was implemented in Region 1 to educate anglers to adopt a responsible attitude to recreational fishing.

PACIFIC OYSTER CONTROL PLAN

A three-year control plan for the introduced Pacific (*Crassostrea gigas*) oyster began in April. The plan establishes four zones for oyster farming (Table 1) and restricts the movement of oysters between some zones. The plan aims to protect the Sydney rock oyster (*Saccostrea commercialis*) industry by limiting the spread of the Pacific oyster.

A three-year plan to control the spread of the introduced Pacific oyster was gazetted. The NSW industry is based on the small gourmet Sydney rock oyster (top right).

Pacific oyster control plan. Oyster movements are permitted as follows (subject to other provisions of the plan)

Zone	Movements permitted*	Movements not permitted
1 All estuaries north of and including the Sandon River.	Within zone unrestricted except Brunswick River.	To zone 2, 3 or 4 or to the Brunswick River.
2 All estuaries from Khappinghat Creek to the Wooli River (inclusive)	Within zone unrestricted. To zones 1, 3, 4.	
3 All estuaries from Wallis Lake to the Clyde River (inclusive).	Within zone unrestricted. To zone 4—caught sticks less than 1 year after initial catch and oysters of any grade free of Pacific oysters. To zone 1—unrestricted subject to criteria.	To zone 2.
4 All estuaries south of the Clyde River.	Within zone unrestricted. To zones 1, 3.	To zone 2.
Brunswick River	To zones 1, 3, 4.	To zone 2.

* Movements within any one area subject to Schedule 1A and 1B.

MARINE HABITAT MANAGEMENT

A new Fisheries Habitat Management Unit was established during the year. This reflects increasing concern at the effect of environmental degradation on the State's fish stocks. The Unit develops policy and coordinates habitat assessment and management action.

During the year, fisheries staff appeared at four Commissions of Inquiry under the Environmental Planning and Assessment Act, prepared over 40 submissions in response to draft local and regional environment plans, and evaluated many development proposals and environmental impact statements which affected fisheries interests. Key issues have included dredging of estuaries, wetland destruction, offshore waste dumping and the development of strategies to deal with build-up of toxic substances in fish and oysters.

The Unit represented the Department on committees for ocean dumping of waste and for estuarine and waterway management plans for Port Hacking, Pittwater, Lake Macquarie, the Clarence River, Lake Illawarra and parts of Sydney Harbour.

Achieving habitat restoration following prosecutions for illegal dredging and reclamation has been a problem throughout the year since many developers do not recognise the importance of estuarine habitats such as seagrasses and mangroves. Seagrass beds are particularly important since they are nursery areas for many fish species and their destruction can reduce populations of recreationally and commercially important fish.

Under the Fisheries and Oyster Farms Act dredging and reclamation are illegal unless consent is obtained from the Minister. It is possible to carry out these activities in a manner sympathetic to the environment and approval is generally granted provided specified safeguards are met.

MARINE AQUACULTURE

Oysters. There are now 1054 oyster farmers in NSW, with oyster cultivation being carried out in estuaries all along the coast. Production in 1986–87 was 103 000 bags from about 3800 leases. Each bag contains about 100 dozen oysters with a wholesale price of $300.

Severe flooding on the North and Central Coasts in autumn caused crop losses in some estuaries.

An open day was held in September at the Brackish Water Fish Culture Research Station, Port Stephens, to provide access to current management developments and research results.

An Oyster Industry Task Force consisting of departmental and industry representatives was formed to examine all aspects of the industry and to report to the Minister on a strategic management plan for the industry's future. The task force met with oyster farmers, research scientists and local and state government agencies and visited a number of oyster growing areas. A final report on future directions for the industry will be submitted to the Minister at the end of 1988. Recommendations will cover administration, regulation, leasing and marketing.

Prawn farming. Currently there are about 200 ha of prawn farming ponds actually constructed with another 300 ha approved for construction in NSW. Seven farms have been producing prawns and it is likely that another four farmers or companies will enter the industry in the next two years. Construction of at least an additional 40 ha of ponds is likely in the next twelve months. There are three major prawn hatcheries and one small one in NSW. Interstate hatcheries are also major suppliers to the industry in this State.

Production rates for all prawn species farmed have increased (Table 2). The major species is the leader prawn (*Penaeus monodon*). Other, less important species farmed include other tiger prawns and school prawns (*Metapenaeus macleayi*).

Prawn production, all species

	Average yield for each farm (kg/ha/crop)	Average survival rate (%)	Total production (tonnes)
1986–87	230	18	15
1987–88	1100	59	40

Farms stocked at ≥ 8 prawns/m² will yield an estimated average production of 1530 kg/ha/crop.

The gross value of edible prawns produced (price received by farmer) in 1987–88 was over $500,000. This was achieved despite the fact that only 48 ha of ponds were in production in 1987–88 and of this total some 22 ha were stocked at a low density.

MARINE FISHERIES RESEARCH AND DEVELOPMENT

Marine fisheries exploration, research and resource assessment are carried out at the Fisheries Research Institute, Cronulla, with additional facilities at research stations located at Port Stephens and Grafton.

MARINE EXPLORATION

The fisheries research vessel FRV *Kapala* was used in a number of research programs related to stock assessment. The most important of these was exploratory fishing for orange roughy (*Hoplostethus altanticus*) along the east coast. In June 1988 2 t of this species was caught and, while a single catch such as this should be treated with caution, it does indicate that there may be some potential for commercial exploitation along the NSW coast. The program, which is funded by the Fisheries Development Trust Account, aims at determining whether there are extensive aggregations of fish off the NSW coast, and provides specimens for ageing and analysis of the reproductive cycle.

Other projects which used the *Kapala* included tagging of snapper (*Chrysophrys australis*), the North Coast estuarine studies and larval distribution of gemfish. Staff from the *Kapala* also ran two short courses for fishermen on marine electronics and net technology.

WATER BOARD DEEP OCEAN OUTFALL ASSESSMENT

The Water Board is preparing to discharge treated sewage from Sydney into the ocean through outfalls located three kilometres offshore. Sewage will be pumped through a series of pipes and tunnels to dissipaters placed 10 metres off the ocean floor. The Board commissioned the Research Institute to carry out pilot studies on the methodology of assessing and monitoring the impact of the outfalls on the habitat and aquatic fauna near the sites. The pilot study tested and discarded a number of sampling methods including trapping and dredging and provided a design for the monitoring program which has now been accepted by the Board.

Results showed that the ecosystem near the outfalls is both diverse and highly productive. Several indicator species (for example wobbegong sharks, *Orectolobus ornatus*) that will be monitored regularly were identified.

The results of this survey led to a four-year contract between the Division and the Board. The Board will lease the FRV *Kamala* full time to carry out offshore research.

JERVIS BAY STUDY

The Department of Defence has proposed the relocation of naval facilities from Port Jackson to Jervis Bay and will prepare an environmental impact statement. It has contracted NSW Agriculture & Fisheries to conduct associated studies. This is a three-year project looking at the effects that the naval facilities and operations would have on the marine ecology of the area.

Jervis Bay is essentially undeveloped and has a relatively undisturbed ecology. It is important for both recreational and commercial fishing and provides major resources of scallops, prawns and inshore fish such as flathead (*Platycephalus fuscus*), whiting (*Sillago ciliata*) and mullet (*Mugil cephalus*). It contains extensive beds of seagrasses; part of the area is being considered for an aquatic reserve or marine park.

The Department will carry out four major studies, costing $400,000, to investigate:

- the fish and macroinvertebrates associated with creeks and seagrass beds
- the fish associated with natural rocky reefs and artificial structures
- molluscan ecology
- the commercial and recreational fisheries of Jervis Bay.

Other studies will be carried out in conjunction with CSIRO.

The studies will be completed in three years and will ultimately involve thirteen people, including four biologists and a number of specialist technical staff. Research began in June 1988.

NORTH COAST ESTUARINE STUDY

Because of increasing concern by recreational fishermen and reports from commercial fishermen that catches were declining, NSW Agriculture & Fisheries began a study on the North Coast river estuaries in February. This is a multidisciplinary project with the primary aim of determining the state of the stocks of important commercial and recreational species, their level of exploitation, the

Fish tagged in Northern Rivers Study February to May 1988
a. Clarence River

	Bream	Whiting	Flathead	Luderick	Tailor	TOTAL
Tagged						
February	75	182	9	8	6	280
March	219	356	25	68	4	672
April	329	166	2	33	5	535
TOTAL	623	704	36	109	15	1487
Recaptured						
Amateur	1	1	1	1	0	4
Gill netting	0	0	0	2	0	2
Beach seining	0	5	0	0	0	5
Prawn trawl	1	2	0	0	0	3
Pro handline	1	0	0	0	0	1
Scientific	0	1	0	0	0	1
TOTAL	3	9	1	3	0	16

b. Richmond River

	Bream	Whiting	Flathead	Luderick	TOTAL
Tagged					
February	87	21	4	2	114
March	206	285	8	30	529
April	262	215	5	28	510
TOTAL	555	521	17	60	1153
Recaptured					
Amateur	5	2	0	0	7
Beach seining	0	1	0	0	1
Scientific	11	20	0	0	31
TOTAL	16	23	0	0	39

effect of prawn trawling on fish stocks and their habitat, and the effects of commercial mesh netting and hauling on fish populations. An important component of the project is the evaluation of the effects of human settlement and habitat modification, such as drainage canals, flood mitigation schemes and wetland destruction, on fish population changes.

From February until May over 2600 fish had been tagged; there were 24 recaptures. Tagging is expected to continue in the Richmond and Clarence Rivers for at least the next 18 months. The Tweed and Brunswick Rivers will also be assessed.

Over 2500 fish were tagged in the Northern Rivers Estuary Study; 55 were recaptured within five months.

apala *carries out a reseach trawl off the NSW coast.*

By-catch of prawn trawlers will be monitored during the next three prawn trawling seasons (October to April) in the Clarence River. A creel survey, designed to determine recreational fishing catch patterns, has already begun. In a multidisciplinary approach to habitat modification, scientists in water and soil chemistry and land use from this Department and from the State Pollution Control Commission will contribute to the study.

The study will continue for five years and will recommend on the management of the commercial and recreational fisheries, habitat protection and rehabilitation.

OYSTER HATCHERY

A new oyster hatchery was completed at the Brackish Water Fish Culture Research Station in March 1988. Built at a cost of $1.2 million, this hatchery, the most modern in Australia, provides facilities for the culture of oyster larvae and, where appropriate, fish larvae such as Australian bass (*Macquaria novemaculata*). Algae are produced semi-automatically and are fed continuously to developing oysters or fish.

While the hatchery will provide some oyster spat for commercial oyster farmers, its main purpose is for selective breeding of the Sydney Rock oyster. Oysters have been cultivated for over 100 years in NSW yet there has been no attempt to improve their quality.

By carrying out selective breeding trials and then growing the progeny of the trials in conjunction with commercial oyster farmers, it is hoped to make rapid gains in the quality of oysters produced. Characteristics that are susceptible to selective breeding and which should show a rapid improvement are growth rate, shell shape and disease resistance.

Increased research effort will be put into aspects of oyster cultivation such as overstocking in estuaries, spat settlement rates, factors influencing settlement and differences between the breeding characteristics of Pacific and Sydney rock oysters.

CONTINUING PROJECTS

Research continued into snapper, prawns, lobsters, crabs, estuarine habitats, tunas and gamefish, oyster diseases and prawn culture. Experimental work on gemfish and the south east trawl fishery was reduced and results are now being analysed and prepared for publication.

INLAND FISHERIES REGULATION AND MANAGEMENT

The management of inland fisheries in NSW has placed equal emphasis on law enforcement and habitat protection as management strategies. Stocking of waterways has been continued to assist recreational fisheries.

LICENSING

The Inland Angling Licence was abolished in April. It had been introduced in 1959 as part of the increased research activity associated with the establishment of the Inland Fisheries Research Station at Narrandera. Over recent years the licence provided $1.2 million annually in revenue but cost over $600,000 to collect and enforce. The Minister for Agriculture and Rural Affairs considered that, in view of the relatively low amount raised by the licence, and the imposition placed on country anglers and not on coastal saltwater recreational fishermen, it would be of benefit to

The job of the fisheries inspector encompasses all aspects of field management including law enforcement, habitat assessment and education.

abolish the licence. However, research and management of inland fisheries will remain a high priority.

Although the licence has been abolished, all other regulations relating to inland fishing (including prohibition on nets, legal length, closed season and restrictions on set lines) remain.

ENDANGERED SPECIES

Protection of the habitat of the endangered eastern freshwater cod (*Maccullochella* sp. nov.) in the Mann River has been the subject of negotiations with the Public Works Department and the Department of Water Resources. Water use conflict has been a problem because of the need to augment the Glen Innes water supply by pumping from the Mann River. Excessive reduction in flows during critical spawning periods could further endanger the population.

Taking Murray cod (*M. peeli*) and trout cod (*M. macquariensis*) is now prohibited in the Murray River between Yarrawonga Weir and Tocumwal. The ban was introduced to protect the endangered trout cod, the last confirmed NSW population being found in these waters. Murray cod was included in the ban because it can be difficult to distinguish between the two species. Local councils have supported the ban during the year.

AQUACULTURE

There has been increased interest in the farming of warm water fish species for domestic and overseas markets. Twelve new fish farms were established in 1987–88, five of these being crayfish farms.

The Department has emphasised the need for high security and other environmental safeguards in the management of fish farms to ensure that disease and undesirable fish species are not introduced into natural waterways. Disease control is also important to protect other fish farms.

To improve the Department's expertise in control of fish diseases, a Special Veterinary Officer (Fish Diseases), based in Region 1, has been appointed and will have responsibility for developing expertise in the diagnosis, treatment and control of fish diseases. The disease-testing service will be provided for the aquaculture industry and for investigating fish kills.

A major fish farming venture in the Bourke area has now received most of the required government approvals.

MURRAY-DARLING BASIN MINISTERIAL COUNCIL

Under the Council, the River Murray Commission has been reconstituted as the Murray-Darling Basin Commission. The Department has contributed to a number of committees and studies related to fisheries for the Council and Commission, including the preparation of a fish management plan for the Basin, the Desnagging Working Group and the Environment Committee.

STOCKING OF WATERWAYS WITH FISH

The Department's stocking program continued with the objective of improving recreational inland fishing.

Juvenile fish and trout ova were placed in about 30 rivers and impoundments. Fifty thousand golden perch fry (*Macquaria ambigua*) were given to the Victorian Government in exchange for 50 000 Macquarie perch (*M. australasica*) larvae. Macquarie perch were stocked at Khancoban Pondage, and Murray cod were stocked at Blowering Dam.

The Gaden Hatchery at Jindabyne continued to produce trout stock successfully despite some deterioration in the water quality of the Thredbo River because of upstream development. Trout did not run in the Thredbo River in 1987 and brood fish, both brown trout

Commercial freshwater aquaculture—production by species, methods and value 1987–88

Species	Production	Methods	Value
Rainbow trout	100 tonnes	Raceways and ponds	$6.50/kg
Brown trout	2 tonnes	Raceways	$6.50/kg
Goldfish	800 000 fish	Ponds and tanks	20c ea.
Yabbies	2 tonnes	Ponds	$6.50/kg
Golden perch	500 000 fingerlings	Ponds	50c ea.
Murray cod	100 000 fingerlings	Ponds	$1.00 ea

Research and stocking programs in inland rivers improve fishing for species such as brown and rainbow trout and Australian bass.

(*Salmo trutta*) and rainbow trout (*S. gairdneri*), had to be captured in the Eucumbene River.

At Dutton Hatchery near Armidale serious problems with water temperature resulted in the loss of brood fish and, consequently, low production for the year.

HABITAT MANAGEMENT

The establishment of the Fisheries Habitat Management Unit has enabled more active participation in inland fisheries habitat protection.

The Department has emphasised the establishment of cooperative relationships with other state and local government authorities and, in conjunction with regional staff, has prepared submissions in response to over 20 planning inquiries and development proposals for inland areas.

Water management issues (in terms of quality, quantity and flow regimes) have been a major source of concern. The need for an understanding of fisheries requirements in all decisions affecting stream flow has been promoted. Of significance was participation in a joint working group with the Department of Water Resources and the River Murray Commission to review desnagging in the Murray River between Albury and Yarrawonga. The desnagging program involves removing large fallen trees from the river bed and is designed to increase the water carrying capacity of the river channel. These snags, however, are an important fish habitat and as a result of concerns by local angling groups and departmental staff the River Murray Commission agreed to review the project. Of the 88 snags identified for removal during 1987, 75 were left *in situ*, meaning a major saving of fish habitat.

The obstruction of free fish passage along rivers is still a major problem. Although research on fish ladder design has progressed significantly, several new and reconstructed weirs and dams have not had fish ladders incorporated in their design and now present barriers to normal fish movement. Negotiations are continuing with the Public Works

Department to have ladders included in the Wilcannia, Boggabilla and upper Wyong weirs. The River Murray Commission has provided funds for the construction of a fish ladder in Torrumbarry weir. Construction began recently. The Department of Water Resources provided funds for the installation of a fish ladder on the Penrith weir, due for completion in July 1988.

The Department participated in four workshops on catchment management. Planning for land and water use on an integrated catchment basis has been seen as an important component of fisheries management in inland areas.

INLAND FISHERIES RESEARCH AND DEVELOPMENT

Freshwater research and development projects cover a diversity of issues in both eastern and western riverine systems and impoundments. Officers conducting these projects are based at Narrandera and Cronulla.

Research programs which continued through the year include:

- the development of hatchery techniques for the artificial propagation of major freshwater species including Murray cod, trout cod, eastern freshwater cod and Australian bass
- determination of the optimum size and densities for stocking of fingerlings into water impoundments
- evaluation of the stream flow requirements of native freshwater species and determination of how these requirements can best be met with the increasing competition for water for agricultural purposes in inland areas
- determination of optimum designs for fishways to facilitate the passage of native fish past dams and weirs
- fish sampling in Burrinjuck dam
- studies on the introduced redfin (*Perca fluviatilis*) which has moved into the Burrinjuck impoundment; evidence is accumulating that it is responsible for a significant decline of native species
- monitoring of the brown trout fishery to compare natural recruitment of rainbow trout with the level of production of stocked fish.

WINGECARRIBEE RIVER

The Fisheries Research Institute began surveys of the Wingecarribee River in conjunction with the Water Board to assess the impact of proposed stream management works on native fish populations.

AGRICULTURAL SUPPORT SERVICES

F2
F3
F4
UNDO
REPEAT
CALC
ROL
SHIFT
ALT

TECHNICAL SERVICES

COMPUTER SERVICES

AGNET COMPUTER NETWORK

The Computer Funding Priorities Committee allocated the Department sufficient funds to upgrade all of the Prime computers on AGNET:

- A Prime 6350 was installed in Head Office. This has a 32 megabyte memory and 4.3 gigabytes of disc storage.
- A Prime 9955-I was transferred from Head Office to Tamworth.
- Prime 2755s were installed at Wollongbar and Yanco.
- A Prime 2655 was installed at Cronulla.
- Prime 550s from Wollongbar, Yanco and Tamworth were relocated to Orange (second machine), Glenfield and Rydalmere.
- A Prime 850, acquired from the Department of Finance, was installed at Trangie.
- The number of terminals was increased to around 600 microcomputers and 150 'dumb' terminals.
- A sophisticated terminal-switching device was installed in Head Office to minimise the future cost of expanding terminal access to AGNET.

The Department reviewed its Strategic Plan for Information Systems and made submissions to the Computer Funding Priorities Committee for further funding in 1988–89.

COMPUTING APPLICATIONS

Consultants completed the development of the Fisheries Licensing and Catch Statistics System. The system was implemented on AGNET in November 1987. The Minister's Parliamentary Question Time Folder was similarly put onto AGNET in late 1987 allowing Ministerial staff access to the Folder from Parliament House.

The Computer Funding Priorities Committee allocated funds for the following major projects on which work began:

- An animal disease information system to be known as VETLINK
- An information system for agricultural and veterinary chemicals.

BIOMETRY

Successful experimentation requires careful attention at all stages from planning to reporting of conclusions. The experimental process is most successful when there is close cooperation between the experimenter and the consulting statistician.

The Biometrical Branch continued to advise departmental officers involved with research, advisory and regulatory programs on appropriate methods for conducting experiments and analysing data. Consulting duties were performed by the Director and Deputy Director of the Biometrical Branch and their professional staff of 16 Biometricians, 12 of whom are located at research stations or institutes throughout the State. This group of statisticians contributes to biological investigations and to some aspects of statistical methodology itself.

A study of the extent of bias in neighbour analysis procedures found that estimates of treatment effects from spatial methods have lower biases than those from traditional randomisation methods. A workshop for plant breeders from Australia and overseas has been organised to report these findings. An extension of spatial analysis methods for data from unreplicated trials was made for testing early generations of cereal cultivars.

Research on row and column designs has resulted in the discovery of additional complete sets of Latin squares. These results contradict currently held beliefs. More research will be done to determine whether the new sets are equivalent to the previously known set.

ARCHITECTURE

The Department was provided with $14.696 million for Capital Works for 1987–88, including $1.422 million for the purchase of plant and equipment, roadworks and some cottage maintenance. Additional facilities were constructed with funds provided from Consolidated Fund and rural industries.

The construction of Stage 1 of the Elizabeth Macarthur Agricultural Institute at a cost of $21.195 million is ahead of schedule. Work

The new library at the North Coast Agricultural Institute, Wollongbar.

to the value of $9.86 million was accomplished in 1987–88.

Included in the Capital Works program was $1.257 million, provided by the Commonwealth for major extensions at the C. B. Alexander Agricultural College, Paterson. The College library was extended, additional space was provided for the Correspondence Courses Production Unit and a new demonstration laboratory and machinery shed were constructed.

An oyster hatchery costing $1.2 million was built at the Brackish Water Fish Culture Research Station, Salamander Bay.

The Department bought two irrigation properties at Deniliquin. They have high water tables and will enable the Department to implement research projects designed to resolve the problems of salinity and high water tables in south western irrigation areas of NSW.

Major safety renovations continued at the Biological and Chemical Research Institute, Rydalmere. The cost for the year was $569,821. Work on the chemistry wing was finalised and renovations began on the administration and library complex.

Major works completed during the year. (Figures in parentheses are total costs)

	1987–88 Expenditure ($)
Elizabeth Macarthur Agricultural Institute, Stage I ($21,195 million) (40% completed)	9,861,000
Oyster Hatchery, Brackish Water Fish Culture Research Station, Salamander Bay ($1.2 million)	631,000
Biological and Chemical Research Institute, safety renovations Block A	570,000
Extensions, C. B. Alexander Agricultural College, Paterson ($1.257 million)	1,023,000
Wool-handling facilities, Agricultural Research Station, Trangie (industry funds)	99,000
Replacement fisheries cottage, Agricultural Research Station, Bathurst	75,000
Principal's cottage, Murrumbidgee College of Agriculture, Yanco	80,000

ASSETS

The Department has 27 research establishments with extensive laboratory facilities, and two agricultural colleges. These are located on a total of 14 787 ha of agricultural land where crops and livestock, essential to the Department's research, advisory and educational functions, are produced. The Department also occupies 1582 ha of land comprising the Camden Park Estate.

During 1987–88 the Department spent $1.422 million on the purchase of plant and equipment.

TECHNOLOGY TRANSFER

Emphasis is being given to ensuring that intellectual property arising from the research and development activities in NSW government instrumentalities is used to promote industry and employment in NSW. Commonwealth rural research and development funding bodies now also emphasise the commercialisation of technology arising from projects supported by them.

To coordinate these initiatives, a Research and Development Services Section has been

AGVIEW 88
Horticultu
FIELD DISPLAY

Agview, 88, the Department's principal bicentennial event, held at the Elizabeth Macarthur Agricultural Institute, Camden Park, Menangle.

established within the Division of Agricultural Services under the leadership of the Department's Research Coordinator. The Principal Officer (Technology Transfer) works with both divisional and regional leaders and the Department's Patents Committee. Close attention is being paid to the identification and protection of the Department's intellectual property with the potential for commercialisation. This includes plant types, statistical software, expert systems and agricultural machinery.

PUBLICATIONS AND INFORMATION

Publications, press, radio, television and video are used extensively by the Department to get information to farmers, fishers and the general public. Because of the great volume of work, the Department generally employs its own experts to produce publications, displays, media releases, radio tapes and videos.

PRINTED PUBLICATIONS

The Department's main information series, Agfacts, consolidated its position as the prime source of agricultural and fisheries information for the public in NSW, and probably in Australia. The number of titles in the series rose from 1106 in June 1987 to 1223 in June 1988, an increase of 117. A further 19 titles were revised during the period, and 15 were reprinted.

The cover prices of Agfacts were raised on 1 July 1987, and the mailing charge of $1 per order was dropped.

The Agfact subscription charge remained at $45. This entitles subscribers to receive mailed batches of all new and revised Agfacts through the Government Printing Office. Numbers of subscribers fluctuated from month to month, with 1079 at 30 June 1988.

Term printing contracts, arranged on our behalf by the Government Printing Office, dramatically reduced the time taken to print Agfacts by up to five months.

Fisheries Law in New South Wales by Gerard Carter, a comprehensive text book for people involved in the complex area of fisheries law, was published by the Department. The main audience was departmental staff and libraries, but copies were also sold to the public.

AGFACTS
Hydroponics growing pl without
Trout in Ne South Wa
Plant bugs
Sunflower growing
Mangroves
Cherry growing

The popular Agfact series of advisory publications.

Publications and media output that appeared during period

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	HO & Statewide Establishments	Total
a. 1987–88							
1. Original press releases	469	1162	565	417	280	161	3054
2. Original radio broadcasts	96	1317	345	8	341	111	2218
3. Video tapes produced	4	19	213	20	10	19	285
4. Original TV programs	22	67	57	41	134	15	336
5. Agfacts							151
6. Scientific bulletins published by Dept							16
7. Newsletters currently published	8	27	7	12	6	21	81
8. Newsletter editions produced	31	106	17	58	16	37	265
9. Contributions to newsletters	225	440	122	504	36	533	1860
10. Brochures, stickers, posters, folders	3	14	0	5	61	51	134
11. Information sheets	11	153	163	31	0	114	472
12. Booklets	2	63	54	11	37	84	251
13. Professional display boards	0	30	16	44	68	539	697
14. Other display boards	52	26	76	5	4	477	640
b. 1986–87							
15. Papers and notes published in scientific journals	58	15	0	0	0	212	285
16. Books, book chapters and postgraduate theses	6	2	2	0	0	31	41
17. Contributions to proceedings of societies	60	14	4	0	0	152	230

The second edition of *Farming in a Small Way*, edited by Gordon Yabsley, was published following the success of the first edition. Over 1300 copies were sold in the first nine months to hobby farmers and others interested in small-area farming.

SALES

Sales of publications from all sources to the public rose from $252,720 in 1986–87 to $357,602 in 1987–88. This total was made up of $98,688 from Agfacts; $83 from fisheries posters and leaflets; $68,381 from other books and posters; $36,799 from Agfact subscriptions sold during 1987–88; and $153,651 (including $76,713 that should have been credited during 1986–87) from the sale of Commonwealth-funded publications.

DISPLAYS

Professionally designed and constructed displays continued to play a major role in providing information to the Department's clientele. Major displays were mounted for Co-operatives Week, the Australian Veterinary Chemicals Association conference, the Royal Easter Show, Agview 88, Agquip and the Orange National Field Days. Numerous smaller displays were provided for other field days, conferences and country shows.

The Department won third prize in the Best Primary Industries and Horticultural Display section at the 1988 Royal Easter Show for its 'Care with Chemicals' display.

LIBRARIES

The Department's 11 staffed libraries provide reference information and ensure that literature published by the Department is widely available on cooperative databases.

Developments in information technology, such as faster and cheaper microcomputers and software, are rapidly changing the ways in which information is used and that librarians function. The library network is taking advantage of these developments by reorganising its collection and building databases to allow information to be quickly obtained from any departmental location.

The Department is a major contributor to two external book databases—ABOA (Australian Bibliography of Agriculture) and CLANN—as well as two external journal control databases—GPASS (Globe Pass) and NCS (Non Current Serials). The Department contributed over 2000 entries to ABOA, and 3397 entries to CLANN, the cooperative book catalogue which now contains more than 2 million entries.

Most of the Department's book vote was spent on buying journals that keep officers up-to-date in their areas of expertise. This year, the Department bought, exchanged or was given 4650 items in serial format. A limited number of specialist books were also bought.

HRH the Princess Royal at the NSW Agriculture & Fisheries display at the Royal Easter Show.

THE PRIMARY PRODUCTS PROMOTIONS UNIT

Six years ago, the Department established the Primary Products Promotions Unit (PPPU) to promote the concept that 'Fresh is Best'. The PPPU has the following aims and objectives:

- To promote the 'Fresh is Best' message to consumers, the hospitality industry and educators, thus creating an awareness of good nutrition and increasing the consumption of fresh food, thereby increasing sales for producers
- To provide and maintain a communications link between growers, agents, wholesalers, retailers and consumers, indirectly creating public awareness of the role of the producers and the needs of the consumers in the production of fresh produce.

The PPPU's 'Fresh is Best' campaign continued to make a sound impact on consumers, peaking frequently as a result of specific promotions. Promotional activities were conducted with the media, through education and through liaison with growers, agents, retailers and consumers.

PROMOTION WITH MEDIA

Television. A weekly, five-minute, promotional spot on Channel 7's national morning show *11 AM* in 1987 featured a range of topics including goat meat and dairy products, Nutrition Week and specific fruits and vegetables. On average, 500 viewers wrote in to request recipes from the 'Fresh is Best' Test Kitchen after each show.

Preparing promotional material in the Department's 'Fresh Is Best' Kitchen.

Occasional appearances on Channel 7's *Cartoon Connection* and *Romper Room* aimed at creating awareness of fruit and vegetables in the younger children's market. Nutrition Week was an important focus for this.

The Unit prepared a weekly script for Channel 7's 7-Text for deaf viewers. This promoted a seasonal fruit or vegetable, giving hints on purchase and storage, and ended with a recipe.

Radio. A report on the best buys in fruit and vegetables was presented every Friday morning on 2BL (ABC). The Unit also gave a fruit and vegetable prices report on the ABC's *Country Hour* every Thursday.

Fifteen weekly interviews were given to country radio stations from July to December and five weekly interviews from February to June. These interviews supported topical promotions such as Nutrition Week, Mushroom Week, Blueberry Week, the Royal Easter Show, the Heart Food Festival and Milk Week as well as featuring seasonal fruit and vegetables with recipes.

Press. The 'Fresh Talk' column was published fortnightly in the magazine section of *The Land* newspaper. Among topics featured were Agview, Orange Field Days, 'Tocal' Small Farms Field Days, good nutrition, seafood, and how to store tomatoes, supporting the Department's drive to promote their proper handling.

The Unit liaised with the *Australian Women's Weekly* magazine on its Fruit or Vegetable of the Month column. Brussels sprouts, navel oranges, carrots, capsicums, apricots and mangoes were featured.

The Unit supplied information on the best fruit and vegetable buys every week to a column in the *Daily Mirror*, the *Daily Telegraph* and the *St. George Leader*. Special articles on bananas and blueberries were published in the *Daily Mirror*.

Articles and recipes on bananas, cherries and tomatoes were printed in several magazines and newspapers in response to press releases issued from the PPPU in association with specific promotions.

Media days. Media Visit Days were organised for:

- the Australian Oyster Farmers' Association and the Food Media Club
- the Young Cherry Growers
- the Exotic Fruits/Avocado Growers' Association and Richmond Avocado Producers.

Several newspaper and magazine articles resulted.

PROMOTION THROUGH EDUCATION

Publications. The PPPU produced the following publications:

- A new poster on 'Nuts, Seeds and Sprouts', No. 7 in the series of 'Fresh is Best' posters. This was launched at the Royal Easter Show with a daily demonstration featuring nuts, seeds and sprouts
- A new historical recipe booklet entitled 'Fresh Was Best . . . And Still Is!' as a contribution to the Bicentenary and a focus for promotional activities throughout the Bicentennial year. This was also launched at the Royal Easter Show and is being promoted with recipe demonstrations at field days throughout the year
- Three new promotional recipe leaflets for specific promotions in association with the Sydney Banana Merchants, the Young Cherry Growers and, for tomatoes, CSIRO Division of Food Research. These promotions are seen as a major breakthrough for the PPPU by providing a special service to growers, agents and retail groups.

Demonstrations and lectures. The School of Home Economics at 12 TAFE colleges and the School of Correspondence were given 'Fresh is Best' update lectures and demonstrations.

'Exotic fruit and new vegetables' lectures (with samples) were given to the Australian Gaslight Company, the Australian Institute of Food Science and Technology's 21st Annual Conference, and the Global Hosts '88 Seminar in conjunction with the International Catering Trade Fair.

'Fresh is Best' promotional demonstrations were given at various field days and shows. These demonstrations promote both the 'Fresh is Best' message and the PPPU's publications and endeavour to support the theme or the locally produced primary products of the host field day.

Consumer service. The Home Economist in the PPPU recorded the 'Fresh Food Line' telephone promotion every week.

The PPPU used a perspex model of the Healthy Diet Pyramid to support all public promotional demonstrations at departmental shows and field days. It has proved popular, on loan, to support other nutritional promotions and seminars.

GROWER, AGENT, RETAILER AND CONSUMER LIAISON

Promotions were organised, with point-of-sale demonstrations and samples, for:

- Nutrition Week
- the Sydney Banana Agents
- the Young Cherry Growers
- CSIRO Division of Food Research.

These demonstrations were conducted in leading shopping centres and fruit and vegetable markets. Results were assessed and reported to the relevant sponsor.

The PPPU supported the Department's research work and the activities of other organisations with demonstrations, taste tests and recipe development.

PESTICIDES

ORGANOCHLORINE COMPOUNDS

The use of persistent organochlorine pesticides such as aldrin, dieldrin, chlordane, heptachlor and DDT has been progressively reduced over a number of years.

Problems encountered in the export beef trade with residues of pesticides resulted in a tightening of restrictions on these materials. All further use of DDT was banned from 15 July 1987. The use of aldrin, dieldrin, chlordane and heptachlor for any purpose other than in accordance with the two relevant Australian standards for termite control was also banned from 1 September 1987. These chemicals may now be used only by pest control operators.

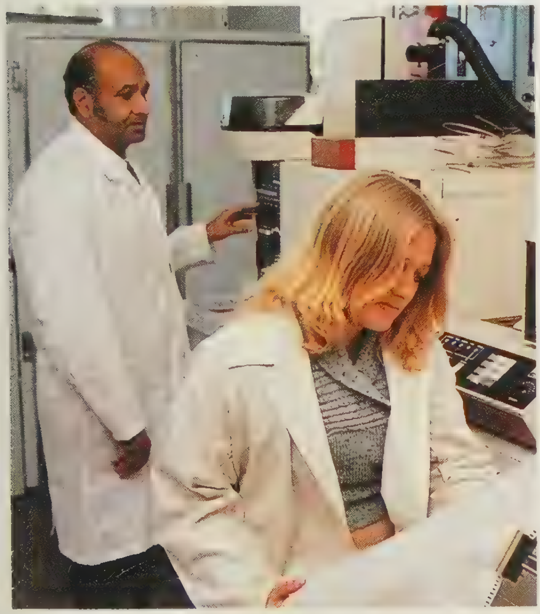
A recall of organochlorines no longer registered for agricultural use but still held by farmers was successful. About 165 tonnes of chemicals were surrendered and were incinerated overseas.

ADMINISTRATIVE CHANGES

On 30 May 1988 the Pesticide Registration Section and the Stock Medicines Branch were merged to form the Agricultural and Veterinary Chemicals Section. This Section is now part of the Division of Animal Health. The Section administers the Pesticides and Allied Chemicals Act 1978 and the veterinary medicines provisions of the Stock Foods and Medicines Act 1940.

APPLICATIONS PROCESSED

The Section considered 787 applications for registration of new products under the Pesticides and Allied Chemicals Act 1978, 287 applications for additional labels, 217 applications for approval of additional container specifications and 603 applications for issue of permits to allow use of pesticides for unregistered purposes. Additionally, 28 applications



Testing for pesticide residues by gas chromotography at BCRI, Rydalmere.

Testing for pesticide residues.

to the Commonwealth Technical Committee on Agricultural Chemicals (TCAC) for clearance of new chemicals were considered. The NSW view was also provided on 56 applications to TCAC for major new uses of existing pesticides and 52 proposals for clearance of technical grade active constituents for use in formulations of pesticides.

Registrations of 14 products were cancelled on advice of the National Health and Medical Research Council.

Eighteen Aircraft (Pesticide Applicator) licences and 33 Pilot (Pesticide Rating) licences were issued during 1987–88.

New Penalties

The maximum penalties under the Act are now $20,000 (formerly $500) for individuals and $40,000 (formerly $2,000) for corporations. This is the first increase since 1978.

Computers

Tenders for the development and implementation of the Agricultural and Veterinary Chemicals Information System were called. The system will improve the availability of information on registered pesticides and veterinary chemicals to departmental staff and assist with registration procedures.

Inspectors

During the past year, inspectors visited more than 4000 manufacturers, wholesalers, retailers, users and pest control operators. Inspectors also carried out 70 investigations resulting from complaints and routine inspections. These inspections and investigations resulted in 10 prosecutions, of which nine related to misuse of pesticides and one to sale of pesticides.

Following the detection of pesticide residues in export beef, inspectors, assisted by other field staff, tested grain storages on 378 properties and found that 20 per cent contained unacceptable residues of organochlorine pesticides. They advised growers on the best possible means of residue reduction in contaminated storages.

Inspectors were also heavily involved in the recall of organochlorine pesticides. Many were responsible for the Regional coordination of collection, storage and transport of these pesticides.

Inspectors reported 53 unregistered pesticides for sale or in use during the year.

Land Resources and Environmental Studies

The Pesticides and Environmental Studies Unit, which previously coordinated the Department's activities in land resources and environmental matters, was restructured to allow a more intense focus on separate study areas. The pesticide component of the Unit has been transferred to the Coordinator of Pesticides and Pest Management and the Unit has been renamed the Land Resources and Environment Unit.

Land Resources

An increase in conflict between everyday farming activities and new settlers in rural areas has highlighted the necessity for local government to consider rural producers' needs in Local Environment Plans. The Department has liaised closely with numerous shires during preparation of Plans and has advocated policies which seek either to avoid or to resolve such conflicts. Additionally the Department has argued that Plans need to give the farming sector flexibility to facilitate farm adjustment so that the agricultural base of rural shires is maintained and enhanced.

Besides consulting with local government the Department has participated with other Departments and Authorities in developing strategies and Plans of regional significance, including the North Coast Regional Environmental Plan (REP), the Siding Springs REP, the Murray River REP and the draft Hunter Region and Macarthur REPs.

The demands on the Department to provide advice to local councils on a wide range of agricultural matters have greatly expanded not only during the preparation of studies and Plans but also in the consideration of development proposals following gazettal of a Plan. This assistance has also extended to providing technical expertise to councils during appearances in the Land and Environment Court. As more councils adopt modern planning instruments the Department's involvement will diminish.

Environmental Impact Assessment

Many development proposals were considered by the Department in relation to their possible impact on agricultural land or activity.

The Department encourages developers to discuss their proposals with regional officers early in the development phase. This allows careful consideration of difficulties before public exhibition of an EIS.

The Department is making a major contribution to a current Commission of Inquiry into a development application to extract sand and soil from the floodplain on the historic agricultural property Camden Park Estate (now managed by the Department and called the Elizabeth Macarthur Agricultural Institute).

DETERMINATIONS UNDER THE MINING ACT

Consistent with the obligation of the Director-General, NSW Agriculture & Fisheries, to make determinations for agricultural land under the first schedule Mining Act 1973, departmental officers inspected and assessed two exploration licence areas, three prospecting licence areas and four mining applications. To promote greater efficiency in this area of departmental activity these responsibilities have now been regionalised.

A review of access to agricultural land for exploration and prospecting purposes has been undertaken by a working party consisting of representatives of the Department of Agriculture, the Department of Mineral Resources, the NSW Farmers' Association and mining interests. The report and recommendations of the committee are being considered.

MAPPING PROGRAM

The agricultural land classes of 80 local government areas were mapped by the Department. The resultant information on land classes was provided to local councils for use in preparing draft local environment plans and considering development applications.

An *Agricultural Land Classification Atlas for the Far South Coast Region (Bega and Eurobodalla Shires)* has been published by the Department and is receiving wide interest and use.

Landsat imagery analysis has continued. As part of a special project the Department is now evaluating the use of satellite imagery for the classification of agricultural land in the horticultural areas of the State.

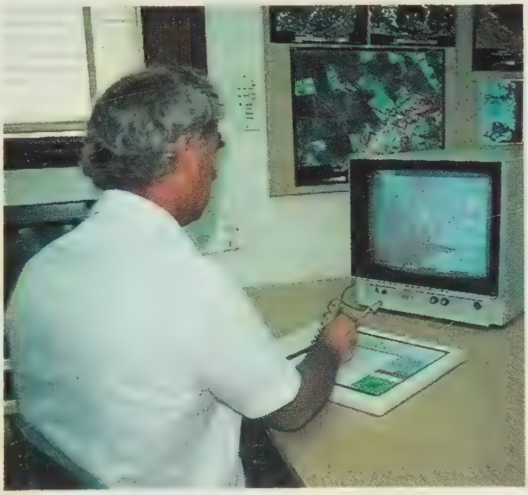
PESTICIDE ADVISORY PROGRAMS

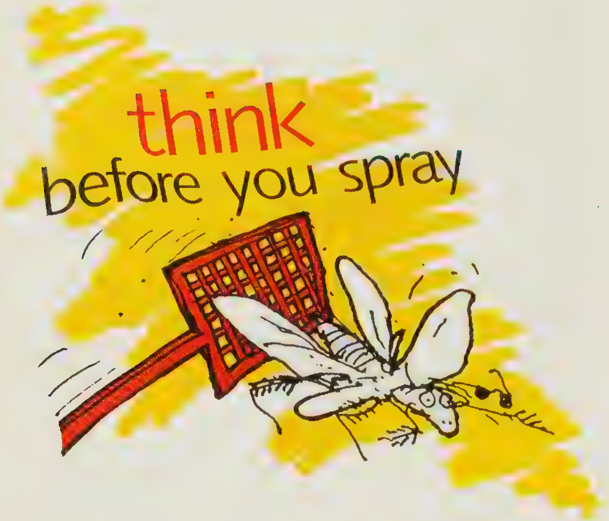
A pesticide project team was established in the Department to plan and implement pesticide advisory programs because of the detection of chemical residues in meat and a greater questioning about the use of pesticides in the community. The team operated for six months and worked closely with regional management to achieve the involvement and commitment of field officers in the successful implementation of the programs. Eighty thousand dollars was provided for operational costs, printing and display purposes.

Training seminars were held at Sydney, Tamworth, Tocal, Wagga Wagga, Yanco, Coffs Harbour, Goulburn, Orange, Dubbo and Rydalmere for 700 staff. All departmental advisory officers, veterinary officers and inspectors were trained in the latest developments with pesticides, regulatory and legal requirements and expectations in providing advice to clients.

Training activities were conducted for non-departmental groups who, in their professional capacity, may give advice on pesticide use. Seminars on garden chemicals were held at Dural, Auburn and the city for 140 people representing gardening magazines, nurseries and major retailers of garden chemicals. Seminars for resellers of pesticides used for commercial horticulture were held at Griffith and Dural.

Images from the Landsat satellite help land-use mapping.





A very successful campaign to make people think before they spray drew public attention to the dangers involved with careless use and storage of pesticides and other chemicals.

Livestock advisory programs were aimed at all major species to avoid chemical residues in meat, milk and fibre. A procedure manual outlining the policy and operations in dealing with residue violations on farms was begun. A field reference flip-card kit was produced, presenting the withholding period of all the pesticides and veterinary chemicals used on domestic livestock species. Residue display boards and an Agfact—*Pesticide Facts—Chemical Residues in Livestock*—were also produced. Field days and seminars for livestock producers dealing with these issues were conducted throughout the State.

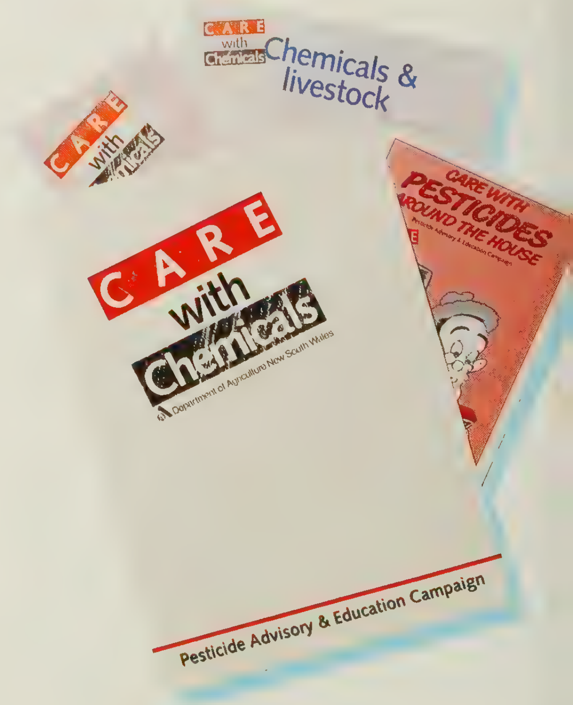
Horticultural pesticide advisory programs were developed by officers servicing the metropolitan and Central Coast districts. Activities included:

- production of pest and disease identification wall charts for vegetables and fruits
- construction and demonstration of a spray calibration 'patternator'
- publication of a pesticide newsletter for growers
- demonstration days at the Flemington vegetable and flower markets
- meetings and seminars with chemical resellers and company representatives
- farmer field days and seminars.

A pilot survey of pesticide residues in vegetables and fruits began in conjunction with the Sydney Farm Produce Market Authority. Some 400 samples of 18 vegetables and 11 fruits were analysed from Flemington Markets, selected roadside retail outlets and interstate. The results showed that all produce sampled was free of harmful residues. Analysis for organochlorine and organophosphate pesticides showed that no samples exceeded the legal limits.

A community education campaign was launched under the slogan 'Think Before You Spray', aimed primarily at school children with subsequent influence in the family home. The message emphasised pesticide safety and alternatives to the use of chemicals in and around the family home.

The Department's 1988 RAS Royal Easter Show exhibit featured the themes 'Care With Chemicals' and 'Think Before You Spray'. It was a highly successful exhibit, complemented by show bags, 10 000 free fly swats, badges and posters. Cartoon character, fold-up, wall posters featuring some of the 'Think' options were distributed to every school in the State. A complementary media campaign was also launched statewide.


CARE with Chemicals
Chemicals & livestock
CARE with Chemicals
CARE WITH PESTICIDES AROUND THE HOUSE
Pesticide Advisory & Education Campaign
CARE with Chemicals
Department of Agriculture New South Wales
Pesticide Advisory & Education Campaign

GROUP ACTIVITIES UNIT, COWRA

The Group Activities Unit provides the head office secretariat for two rural organisations, the Agricultural Bureau of New South Wales Inc. and the Rural Youth Organisation of New South Wales Inc. During the year the organisations became incorporated under the Associations Incorporation Act 1984. The incorporation makes it essential that accurate membership records are kept. To assist in this, the Rural Youth Organisation purchased a microcomputer for the use of the Unit.

THE AGRICULTURAL BUREAU OF NEW SOUTH WALES INC.

The Agricultural Bureau is a statewide organisation of people interested in rural activities. It was founded by the Department of Agriculture in 1910 to disseminate agricultural information and organise agricultural activities in rural areas to the mutual benefit of departmental advisers and Bureau members. Membership for the year totalled 1960 in 56 branches, an 11 per cent increase on 1986–87.

Some of the major programs conducted by the Bureau were:

- the 1987 Annual Conference, Orange Agricultural College, July
- the Murrumbateman Field Days, October
- the reintroduction of the Beef Herd Competition
- wether trials and Merino ewe competitions
- Hoof and Hook carcase competitions
- field days and farm walks.

Other issues that have been addressed are:

- the future direction of rural training
- the rural industry training scheme
- land degradation
- livestock handling.

During the year, 28 220 people attended the 216 functions held. NSW Agriculture & Fisheries staff were involved in 186 of them.

The Department provides $11,000 to assist members of the Executive Council to defray their cost of travel and accommodation to attend meetings. A grant of $1,250 is also made to the Agricultural Bureau to assist with the cost of running its annual conference.

RURAL YOUTH ORGANISATION OF NEW SOUTH WALES INC.

The Rural Youth Organisation is a statewide organisation of young people who are interested in the land, the farm, the home and the rural community. The Organisation aims to make the young people self-reliant, responsible and effective citizens of their community. One of the main objectives is to develop an understanding of the principles of efficient agriculture thereby raising the standards of rural practices.

Membership for the year was 1450 members from 63 clubs.

Some of the major activities during the year were:

- the Annual Conference, Goulburn, in July
- the Major Awards Seminar, Goulburn, in July
- the Top Achievers Award, Sydney
- the Royal Easter Showcamp, Sydney Royal Easter Show
- the Annual Roundup, Bathurst, in January.

Over 600 functions were held throughout the State with a total attendance of over 32 000.

With the assistance of the Reserve Bank, which contributed $2,000 to the project, a special Financial Management Handbook was prepared to assist members to manage club finances and their own personal finances.

The Rural Youth Organisation has become self-sufficient in its funding and received no direct financial assistance from NSW Agriculture & Fisheries.

COMMUNITY EMPLOYMENT PROGRAM

NSW Agriculture & Fisheries completed its last CEP projects during 1987–88. Over the past three years, 160 projects provided 1541 jobs at a total cost of $19.8 million. Other development programs undertaken by the Department included the Youth Employment Scheme and Technical Jobs for Women.

Projects were carried out at the Department's research stations, laboratories, regional offices, technical service institutes and agricultural colleges.

Most of the employment scheme participants attended off-the-job training as well as their normal supervision and instruction on-the-job. This training was organised mostly by departmental staff through temporary training coordinators funded by CEP. Training included personal development, assertiveness, communication, how to apply for jobs and, by counselling, how to keep jobs. Job skills learned included operating office equipment, using computers, writing letters, editorial work, display design and media skills as well as more general clerical skills. Trade skills included driving trucks and tractors, building construction, painting, small motor maintenance, welding and general labouring.

At least a third of projects were building construction and renovations and provided visitor centres, resource centres for teaching, and new offices, laboratories and sheds for improved research and advisory services. Other projects resulted in the development of the historic Camden Park property and the new Fisheries Research Institute at Cronulla. Significant improvements in records and databases were also made.

EDUCATION

AGRICULTURAL COLLEGES

The Department provides tertiary-level agricultural education courses for school leavers on a similar basis to TAFE. It has two colleges—Murrumbidgee College of Agriculture at Yanco and C. B. Alexander Agricultural College ('Tocal') at Paterson. The colleges accept Year 10 school leavers (School Certificate level) and provide courses toward achiev-

ing a Certificate in Agriculture (one year) and an Advanced Certificate in Agriculture (two years). Both are full-time residential courses based on developing practical farm management skills using a real farm situation. The colleges are situated on departmental farming properties.

The colleges also provide courses for more than 3000 adult students each year. These take the form of short courses (one to five days) and external courses (one or two years). The short courses are held at a variety of centres throughout the State and the external courses provide for people disadvantaged by time or distance.

COURSE DEVELOPMENT

At C. B. Alexander College, a training specialist with the Australian Army evaluated the Certificate in Agriculture and the Advanced Certificate in Agriculture. All courses, including the Certificate in Dairying, were refined and improved during the year.

A 'Search' conference at Murrumbidgee College of Agriculture closely examined the need for modifications and additions to courses. The current courses were supported, and recommendations were made that opportunities for students in Pastoral Property Management and Production Horticulture be included in the curriculum. In 1988 options in these areas have been included in first year studies, along with options in Irrigation, Equine Studies and Keyboard Skills.

In 1989 Murrumbidgee College intends to offer new Advanced Certificate courses in Pastoral Property Management and Production Horticulture.

COOPERATION WITH FARMERS

New courses at Murrumbidgee will be developed in cooperation with organisations representing rural groups, including the Isolated Children's Parents' Association and the NSW Farmers' Association.

Students from Murrumbidgee toured western NSW and South Australia to study sheep in arid zones and to consider the broad range of problems associated with pastoral property management. They also attended the South Australian Merino Field Days.

Small Farms Field Days, C. B. Alexlander
ultural College.

Practical training at Murrumbidgee College of Agriculture.

At C. B. Alexander College cooperating farmers are seen as an important asset to the courses. The farmers give the course diversity and allow students to have industry experience while still undertaking their formal training. The network of cooperating farmers is being expanded. Students now work throughout NSW and occasionally interstate; in 1987 two students worked at the Flock House Training Institution in New Zealand.

ADVISORY COUNCILS

The advisory councils provide support and advice in a variety of areas. In 1987 a major topic for discussion was promotion of the colleges and the courses they offered. The councils provide an essential link with rural industry and help ensure that the students receive the skills needed by successful farm workers and managers.

HOME STUDY COURSES AND SHORT COURSES

The Home Study unit at C. B. Alexander College continued to expand its range of electives. The highlight was the production and launch of a new unit entitled 'Facing Your Future on the Land'. This was specifically aimed at preparing farmers for the financial crises that can beset primary producers.

Increased coordination of short courses organised by the college has been made possible by the appointment of an Advisory Officer (Short Courses). This will allow the college to become more involved in educating those already in rural industries.

Murrumbidgee College hosted training courses for a number of organisations, including the Hereford Society, the 'Farm Facts' Farm Business Project Group and the Post Graduate Veterinary Association. These groups studied leadership, computers in farm business management and artificial breeding, respectively.

The farmer education program of short courses continued to be very successful. Land Forming, Computers, Irrigated Pastures, Rice Growing, Trees on Farms and Pesticide Use courses were repeated a number of times during the year. A new course added to the program was one entitled 'Managing Yourself and Others'. This course marks the beginning of a range of 'people skills' courses sought by farmer organisations and their members. Many farmers now plan to attend at least one of these courses each year.

Off-campus short courses grew. Several record keeping and budgeting workshops were conducted, many led by farmers trained by the college to be tutors. As well, two-day courses on various topics were conducted at the farmer education centres at Temora and Deniliquin, and in various venues in other towns. Financial management workshops were held at Ivanhoe, White Cliffs and Tibooburra.

RESOURCES

At C. B. Alexander College the provision of over $1 million by the Commonwealth Government permitted the construction of new demonstration rooms, extensions to the library, reconstruction of a machinery bay area into office space for the Home Study Unit and construction of a new farm shed. Progress has been particularly rapid on this project which will provide the physical resources needed to expand educational services.

FARM REPORT

Murrumbidgee College was well represented at steer shows, particularly at the Dubbo National Show, where it received third prize in the schools section and was highly commended in two other sections.

At C. B. Alexander College a Farm Manager was appointed to oversee maintenance and development of the College's physical resources. This appointment has allowed rationalisation of College farm management.

ENROLMENTS

At both colleges the high level of promotion has resulted in a large increase in inquiries. Consequently, C. B. Alexander College had a full enrolment for 1988 and Murrumbidgee College showed an increase of 40 per cent over 1987 figures.

TRAINING

More than 1200 staff members attended 85 training programs on topics such as public speaking, communication skills, writing, advisory skills, photography, group work, principles of supervision, assertiveness skills, recruitment and selection techniques, telephone techniques, and public relations and negotiating skills. Occupational Health and Safety Committees received mandatory training covering regulations under the Act. The training programs were attended by staff from all levels of the Department, with representatives from every region and Head Office.

Animal industries professional staff began or completed a number of training courses, including project management and staff management workshops and postgraduate courses in animal disease. Twenty veterinary officers began studies to gain membership of the Epidemiology Chapter of the Australian College of Veterinary Scientists. This will significantly improve the Department's ability to formulate, deliver and evaluate preventive veterinary medicine programs for the livestock industry.

Two animal industries staff were awarded Churchill Fellowships and seven officers received industry-funded overseas study awards.

AGRICULTURAL SERVICES—GRANTS

Rural industry research and development grants 1987–88

Funding body	Allocation ($)
Rural industry research funds	
Australian Meat and Livestock Research and Development Corporation	310,855
Barley Research Committee for NSW	183,806
Barley Research Council	172,458
Chicken Meat Research Council	8,500
Cotton Research Council	309,665
Dairy Research Council	85,754
Dried Fruits Research Council	27,005
Fishing Industry Research Committee	802,775
Grain Legumes Research Council	84,898
Grape and Wine Research Council	57,656
Honey Research Council	31,626
Oilseeds Research Council	179,022
Pig Research Council	148,757
Poultry Research Council	23,676
Tobacco Trust Account	45,486
Wheat Research Committee for NSW	990,446
Wheat Research Council	506,038
Wool Research and Development Fund	1,237,547
RURAL INDUSTRY RESEARCH FUNDS TOTAL	5,205,970

Funding body	Allocation ($)
Other major grants	
Australian Special Rural Research Fund	283,116
Horticultural Stock and Nurseries Act Account	55,368
Horticultural Quarantine Research Grants	59,734
Rice Research Committee	311,469
Rural Credits Development Fund	225,601
Swine Compensation Fund (NSW)	245,157
Federal Water Resources Assistance Program	100,000
Australian Water Research Advisory Council	258,293
Citrus Management Company Limited	18,443
Apple and Pear Research Foundation	12,000
Processing Tomato Research Committee	13,322
OTHER MAJOR GRANTS TOTAL	1,582,503

The total research and development grants to the Department from non-Consolidated Revenue sources in 1987–88 exceeded $6.8 million. The table shows the main grants made during the year.

Miscellaneous grants also came from the Australian Centre for International Agricultural Research, Austrade, the National Soil Conservation Program and donations from marketing boards, special interest groups and private companies.

MARKETING SERVICES

AGRICULTURAL STATISTICS

The Central Statistics Unit (CSU) coordinated the collection, storage and dissemination of agricultural statistics within the Department. Information from the Agricultural Census was reformatted and provided to users in the Department on computer disc. The Unit also produced a range of Agricultural Statistics Summary publications which provide statistics for each departmental region within the State. These were made available to departmental users and clients.

The Unit also reviewed and significantly refined its computerised news bulletin which contains economic, market and statistical information on both the rural and national economies.

COMMODITY INTELLIGENCE

Responsibility for the Livestock Market Reporting Service, previously conducted jointly with the Meat Industry Authority, was transferred entirely to the Authority during the year.

Market prices for a range of crop and horticultural products sold at Flemington Markets were collected and reported. The collection and dissemination of quantities as well has been a recent innovation.

The outlook for crop, livestock and horticultural commodities was monitored and advice was provided through regular radio items and newspaper articles, via *CSU News* (an internal electronic newsletter), through electronic data services, in recorded messages and in response to personal inquiries.

MARKETING UNIT

A video was produced on the benefits and pitfalls of producer marketing groups for farmers considering the establishment of a marketing company or cooperative. Production was funded by the Innovative Agricultural Marketing Program.

The Unit provided marketing advice in response to inquiries from producer groups in most sections of NSW agriculture. This included conducting feasibility studies for the formation of new marketing organisations in the North Coast horticulture industry and in the grain legumes industry; and participating on the NSW Apple Industry Task Force, which is developing a strategic plan for marketing apples and apple products on both domestic and export markets. Members of the Unit also gave lectures and talks to producer groups and students in agricultural marketing.

MARKETING BOARDS UNIT

The Marketing Boards Unit is headed by a Director of Marketing, a statutory position established under the Marketing of Primary Products Act 1983. The Director of Marketing issues a separate annual report to Parliament.

MARKETING BOARDS

The eight marketing boards constituted under the Act deal in barley, oilseeds, oats, tobacco leaf, rice, winegrapes in the Murrumbidgee Irrigation Area, citrus fruit in the Murray Valley and citrus fruit on the Central Coast. One other board, the Grain Sorghum Marketing Board, continues to operate under the control of a court-appointed scheme manager. Another board, the Yellow Maize Marketing Board, is managed by an administrator and is winding down its operations.

The other eight marketing boards continue active programs of trading, promotion and market development for their growers. Further details of their activities can be obtained from their annual reports.

The Marketing Boards Unit assists the boards generally in their administration and compliance with the MPP Act. During the year, new regulations were made for the Rice Marketing Board and drafted for the Oats, Barley and Tobacco Boards.

MARKETING ORDERS

Marketing Orders are legal instruments that can be made under the MPP Act 1983 to allow groups of growers protective legislation to cover a particular aspect of their market development. Marketing orders are proving popular with grower groups. In 1986–87 a marketing order gave citrus growers in the MIA authority to establish minimum prices for fruit sold in their area. This year, marketing orders have been made for two other groups. Growers of processing tomatoes in NSW have a marketing order which empowers a committee to establish minimum prices for deliveries to processing factories. Growers of kiwifruit have a marketing order which empowers a committee to collect funds from growers to run promotional campaigns and to fund research.

MANAGAMENT AUDIT

The MPP Act 1983 requires the Director of Marketing to conduct regular effectiveness evaluations, or management audits, of boards established under the Act.

The Director initiated an audit of the Central Coast Citrus Marketing Board during the year. This is the first audit to be carried out within the Director's unit. This audit has incorporated a detailed field survey of growers and will be completed later in 1988.

REGISTRAR OF FARM PRODUCE

The Registrar of Farm Produce, aided by the Deputy-Registrar and farm produce inspectors, administers the NSW Farm Produce Act 1983. This Act requires that all agents and merchants in NSW who deal directly with producers of fruit and vegetables anywhere in Australia are licensed annually. The Act also lays down the terms of trade and payment conditions for the sale of produce to ensure that growers are paid on time and according to the agreement they make with the agent or merchant to whom they consign their produce. Also, under the Act, all licensees are required to hold bonds of $50,000, $100,000 and $150,000 to protect those who consign produce to them, in the event of their financial failure.

LICENSED AGENTS

There are currently 220 licensed farm produce sellers in NSW, of whom 154 operate in the Flemington Markets in Sydney. Of the others, 15 operate in Newcastle Market and the remainder operate as agents and merchants in the main production areas of the MIA, the Murray Valley and coastal areas of the State. Farm produce inspectors are responsible for licensing new applicants and for renewing existing licenses.

COMPLAINTS AND PROSECUTIONS

Growers who feel that agents and merchants buying their produce have not done so under the conditions required by the Act may register complaints with the Registrar, Deputy Registrar or inspectors. Complaints are investigated by the inspectors and may be prepared for hearing at a magistrate's court. During 1987–88, 39 complaints were received; four separate companies, licensed under the Act, were successfully prosecuted on a total of 37 charges. Other cases were brought before the courts and adjourned to later dates in 1988.

EXPORT DEVELOPMENT

The increasing export trade in a wider diversity of natural and added-value produce is evidence that the rural community throughout the State is responding to the new international market opportunities that the Department has been actively promoting over the past three years.

Consequently the Department's Export Development Unit has been able to reduce its role in direct trade arrangements and give greater emphasis to specific project developments in cooperation with private sector companies. A much more detailed program of development was undertaken in the USA, for example, with sheepmeats and horticulture products, in the knowledge that there is increasing industry support for exports of these items.

Visits to Europe, Japan and Hong Kong by the Unit have assisted buyers in those markets to establish long-term relationships with Australian export companies and producer groups in a range of agricultural and fish products.

The pace of development of new agriculture industries throughout the State will be largely dependent upon the levels of investment directed into specific agriculture projects. Those levels of investment will in turn be guided by the confidence which investors have in market security over time.

The Department has long advocated the desirability of joint venture arrangements between the State's producers and private sector companies on the one hand and foreign distributors on the other. Much of the Unit's foreign market activities have been aimed at facilitating these types of investments. It is pleasing to see that such ventures are increasing in a wide range of product sectors including horticulture, poultry, sheepmeat, beef cattle, fish processing, food processing and prawn farming.

ECONOMIC SERVICES

RURAL COST ANALYSIS

A Rural Cost Analysis Unit was established in the Division of Marketing and Economic Services to identify and minimise rural costs. The Unit has begun by analysing government charges and regulations affecting the production and disposal of agricultural products.

POLICY ANALYSIS— MARKETING AND NATURAL RESOURCES

The major achievement of the Economic Policy Unit was the completion of submissions to the Royal Commission into Grain Storage, Handling and Transport and to the Industries Assistance Commission (IAC) inquiry into wheat marketing. The Department's submission to the Royal Commission dealt specifically with grain contaminant control and on-farm storage. The submission to the IAC inquiry outlined and analysed some of the economic costs of the current domestic wheat marketing arrangements and highlighted the need for rationalisation of government involvement. Subsequently, considerable efforts were expended on reviewing the findings of the commissions, developing policies and procedures for implementing their recommendations and contributing to working groups to achieve this through Commonwealth and State legislative changes.

Other important areas of marketing and trade policy work included:

- a reassessment of orderly milk marketing under the 'Kerin Plan' and the implications of interstate trade in market milk for the NSW dairy industry
- research into egg marketing arrangements as part of the preparation for an SCA Working Group report
- preparation of the Department's submission to the Department of Foreign Affairs and Trade's review of the Closer Economic Relations agreement with New Zealand, concentrating on the inputs of the NSW dairy, lamb, fruit and fruit products industries
- analysing the implications of the EEC ban on livestock growth promotants for NSW beef and sheep producers.

Research into resource-based policy issues focused mainly in the water industries and included:

- quantification of the effects of introducing an annual and permanent water transfer scheme and of relaxing land tenure restrictions in irrigation areas
- evaluation of water tendering alternatives and of varying levels of reliability of water supply in the cotton industry
- a benefit-cost analysis of alternative residential zoning proposals within the Buronga Irrigation Area
- assessment of alternative control measures for Pacific Oysters
- a benefit-cost analysis of footrot control as part of an assessment of the feasibility of the footrot strategic plan.

AGRICULTURAL TECHNOLOGY AND INDUSTRY STUDIES

These studies were undertaken to evaluate alternative technologies and farming systems, and changes in industry structure, trends and performance.

The economic impacts of alternative technologies were considered in a range of projects including:

- research aimed at lifting the productivity of wool enterprises in the Western Division through the use of goats for shrub control
- investigation of changes in pasture productivity and development of cash flow models for pasture development options
- evaluation of the benefits and costs of on-farm grain storage by farmers
- evaluation of complex options in matching and owning machinery
- evaluation of breeding programs in the crop and livestock industries
- case studies evaluating alternative forage conservation methods
- evaluation of sustainable land management systems (such as land forming and permanent beds in irrigated agriculture, and liming of acid soils).

Industry studies continued to be important, and included:

- evaluation of cultural and marketing practices in the oyster industry
- estimation of a set of import demand functions for the meat processing sector
- studies of price spreads in the beef, lamb, pig and fish industries. (These are useful for detailing how changes in auction prices affect retail and wholesale prices and costs associated with operations at different levels of the marketing chain)
- an analysis of the structure and performance of the wool tops industry
- an analysis of the NSW lamb industry and the demand for lean lamb
- estimation of the returns to investment in research and development at various stages of the wool industry.

FARM MANAGEMENT

Eight regional economists were redesignated as economists (farm management) as an initiative under the Farm Business Management Program, which is a priority program within the Department's Strategic Plan. As a consequence, substantially greater economic support was provided to advisory officers.

The farm management services of the Department are designed to help farmers adjust to changing economic pressures by providing information and management techniques relevant to farm business decisions. One example of this approach is the Farm Cheque program initiated during the year. Farm Cheque, a farm financial and resource management program, operated in the Condobolin and Young areas. The aim of the program was to prepare farmers to become better managers and decision makers by better use of physical and financial records in whole-farm and comparative analysis. The program has engendered considerable support and interest from a range of advisory staff. Farm business management topics already covered include record keeping, adjustment of enterprise mixes and alternative farm practices. Currently 64 producers from the Young region and 19 from the Condobolin area are involved in the program. Similar programs are being investigated for other regions of the State.

Comprehensive regional budgeting handbooks were provided on most agricultural enterprises undertaken throughout the State.

Agfacts were prepared under the Farm Cheque series on farm business management, record keeping and accounting services available to farmers. Information sheets were prepared on livestock sharefarming, permit wheat, the Australian economy, the wheat market outlook and off-farm investment options.

A directory outlining the services and programs provided by the State Government to the rural community was compiled and distributed to regions and cooperating departments.

A glossary of farm management terms was prepared for advisory officers, students and farmers.

Seminars were conducted to help farmers use farm records, manage 'surplus' cash and appreciate the role of off-farm income in management decisions. One outcome of the seminars was the development of a farm assistance package incorporating a straightforward cash flow sheet. This proved very popular with farmers, accountants and rural counsellors.

Comparative analysis activities were undertaken with various groups of wheat, avocado, wine grape and dairy farmers aimed at highlighting the relationship between alternative farm practices, risk and profitability.

A wool marketing model was developed which allows comparison of different clip selling options and indicates the effect of altering lot sizes on net returns. A computer program to assist oilseed producers in assessing alternative marketing strategies including the use of commodity futures was further developed. Economists cooperated with CSIRO in testing and improving the Rangepack collection of computer programs designed to help with decision making in the pastoral industries.

Economists provided support to the farm management home study program by writing additional units and revising existing units in the program, by tutoring and lecturing, and by assessing students. A major new unit was developed on 'facing your future on the land'.

RURAL COUNSELLING SERVICES

The Division of Marketing and Economic Services is responsible for coordinating the payment of the $120,000 allocation which the State Government contributed to the Rural Counselling Program. To date eight local groups have used the 25 per cent State contribution in applying for the 50 per cent Commonwealth subsidy. The groups are located in the State's cropping area, from Gunnedah in the north to Deniliquin in the south. The rural counsellors provide advice and support on both financial and social issues.

PUBLICATIONS

To promote the widespread use of economic and marketing information and research results, regular printed and computerised publications were issued. The major vehicles were *CSU NEWS*, *Review of Marketing and Economics*, Agfacts, *Commodity Bulletin*, *Agricultural Economics Bulletin*, *Miscellaneous Bulletin*, regional statistics handbooks, regional budget booklets and *State of Agriculture in NSW*.

OVERSEAS PROJECTS

Officers of the Department consulted on agricultural projects in Nigeria, Zimbabwe, Kuwait, China, Papua New Guinea, Indonesia, Thailand, Malaysia and the Philippines. The Overseas Projects Section organised and administered the consultancies and managed the long-term beef and pasture development project in Guangdong Province in China.

Short-term consultancies by departmental staff were funded by a range of bodies:

- The Australian Centre for International Agricultural Research (ACIAR) funded eight consultancies to Indonesia, Thailand, Malaysia and Papua New Guinea for a total of 103 days. All consultancies were related to ACIAR collaborative research projects and included feasibility studies, project operation and review.
- The United Nations International Atomic Energy Agency engaged a consultant to arrange a livestock nutrition research and training program in Nigeria for 34 days.
- The Australian International Development Assistance Bureau (AIDAB) sponsored three consultancies in Zimbabwe, Indonesia and Thailand for a total of 86 days. They involved experts in agricultural education, veterinary project review and goat research techniques.
- Private consultants engaged the specialist services of a soil scientist and a postharvest fruit scientist to consult in Indonesia for a total of 44 days.
- Overseas governments in Kuwait and China funded specialist consultancies in veterinary technology, cattle husbandry and pasture development.

COMMONWEALTH MISSIONS

Professional officers participated in two Commonwealth-funded missions to China:

- A mission of cereal grain specialists to China was led by the Chief, Division of Plant Industries.
- A banana handling and marketing mission to China was led by a departmental postharvest specialist and included a tropical fruit specialist. A return mission of Chinese banana specialists to Australia was funded by the Commonwealth and arranged by the Overseas Projects Section.

Other Commonwealth-funded visits to NSW, organised under the Australia-USSR Agricultural Cooperation Agreement, involved:

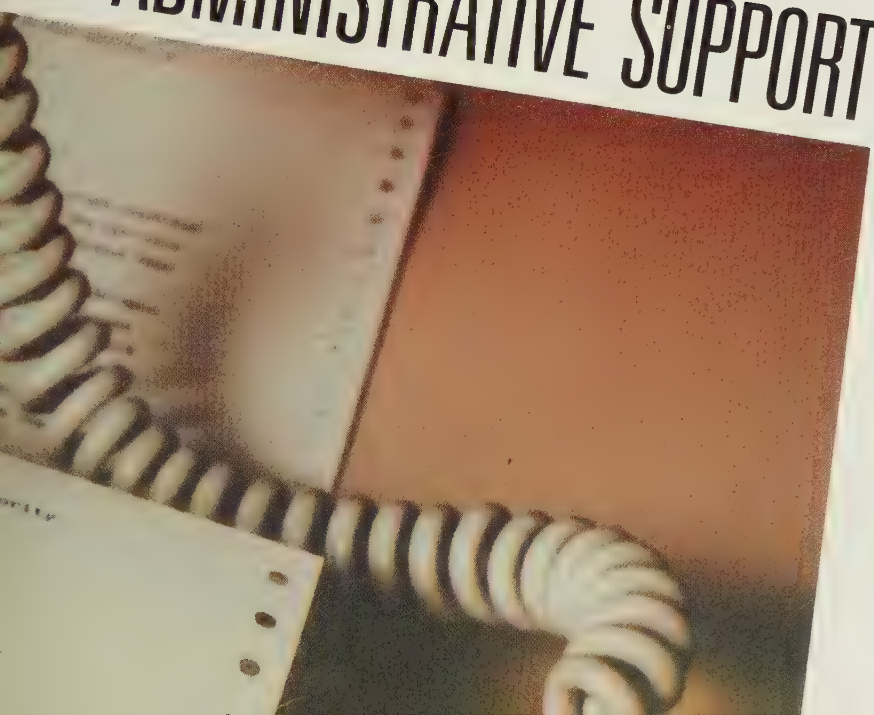
- advanced management and production methods in intensive dairy and beef farming, processing, transport and storage
- joint expeditions to collect plant samples
- improvement of selection methods for grain crop resistance to fungal diseases.

Meetings and visits on agricultural matters were organised for fifteen other groups of official visitors to NSW—a total of 123 visitors from 12 countries.

A pasture and beef cattle development project was managed in the northern part of Guangdong Province, China. Two specialist officers of the Department and their families remain at the project site. The project, which is operating under the New South Wales-Guangdong Sister State Relationship, has continued to make sound progress in the evaluation of legume and grass species and the establishment of pastures.

NSW Agriculture & Fisheries project adviser Mr G. R. Schuhkraft demonstrating ear tagging and drenching of a calf to Chinese technicians at the Model Farm Cattle Project in the north of Guangdong Province, China.

ADMINISTRATIVE SUPPORT SERVICES



ADMINISTRATIVE SUPPORT SERVICES

FINANCIAL MANAGEMENT

During 1986–87, the Department encountered a number of problems with the operation of its computerised and decentralised accounting system. These resulted in criticism by the Auditor-General of the financial management systems.

A departmental Task Force was established to ensure that the annual accounts were presented on time, accounting records at all computing sites were fully reconciled and the Department's Consolidation Ledger was reconciled and reflected the true position.

Touche Ross, a firm of consultants, was engaged to review the Department's Financial Management System. In recommending that the Department continue to operate the system with hardware and software enhancements and a greater input into training, the consultants drew attention to the severe shortage of staff in the financial area. They identified the dedication of the staff of the Department as the major factor behind the continued operation of the system.

The consultants' recommendations are being implemented. The Task Force approach will continue during 1988–89.

PERSONNEL AND STAFFING SERVICES

Major changes occurred in personnel policies and practices relating to the areas of Workers' Compensation, permanent part-time work for temporary employees, superannuation, payment for the use of semi-official telephones and the method of preparation of salary estimates. Departmental procedures were revised to administer these policies.

Work was begun to enable use of the AGNET computer network to transmit staff movement documents, so as to reduce delays and increase productivity. With other improvements to processing systems, more accurate and up-to-date information on staff strength and vacancies was made available for planning purposes. Software enhancements also improved efficiency in processing data for Group Certificates and reconciling the Department's taxation accounts.

In association with the Commonwealth Department of Community Services, the Department maintained its participation in the Work Training Scheme which provides short-term training opportunities for disabled people. The Department also continued to participate in the Aboriginal Clerks' Scheme and the Aboriginal Clerical Assistants' Scheme conducted by the Public Service Board of NSW. Two Aborigines were permanently appointed under these Schemes.

SPECIAL EMPLOYMENT SCHEMES

The Department continued to support special employment programs, aimed at providing vocationally based skills to disadvantaged groups within the community. These schemes are described below:

AUSTRALIAN TRAINEESHIP SYSTEM (ATS)

In January 1988, the Department trained 51 people under this scheme. Employment was offered for:

- office assistants
- laboratory assistants
- gardener's assistants
- stenographers / typists / word processor operators
- assistant stores officers.

The ATS is aimed at providing training and employment opportunities to unemployed youth through a concurrent formal course at TAFE colleges and on-the-job experience with the Department.

TECHNICAL JOBS FOR WOMEN PROGRAM

In early 1988 the Department of Industrial Relations and Employment (DIRE) approved the employment of four trainee computer programmers and five trainee technical officers (scientific). The funding for this program in 1988 was $161,955.

YOUTH EMPLOYMENT SCHEME

DIRE approved an intake in October 1987 of 26 trainees employed in the following categories:

- clerical assistant
- trades assistant
- assistant computer operator
- assistant storesperson.

These positions were distributed throughout the State as well as in the Department's Head Office.

A second intake began in March 1988, consisting of 15 positions, including:

- clerical assistant
- trades assistant (carpentry)
- assistant computer operator
- assistant storesperson
- kitchen hand
- farm/field/outdoor assistant.

TRAINING FOR ABORIGINALS PROGRAM

Twenty apprentices covering various trade categories were employed under a subsidised apprenticeship program designed to provide vocational trade training to Aboriginal youth. This program was negotiated with the Commonwealth Department of Employment, Education and Training (formerly the Department of Employment and Industrial Relations). Those employed under the program will serve a trade apprenticeship for four years involving attendance, instruction and examination through a TAFE college and on-the-job instruction.

INDUSTRIAL RELATIONS

Negotiations for the four per cent, second-tier, productivity increases were coordinated through the Department's Restrictive Work and Management Practices Committee, with a report detailing appropriate cost offsets being prepared. The four per cent salary increase was granted in respect of awards to which the Public Service Board, the Public Service Association and the Public Service Professional Officers' Association were parties. Applications were lodged by the relevant unions to vary Pastures Protection Boards' awards to incorporate the increase.

A number of award claims affecting departmental staff were finalised during the year. Judgment was handed down in the lengthy Camping Allowance and Related Conditions Award case. A 38 hour week was granted to most of the classifications within the General Division Agreement which had not previously been afforded the shorter working week. The Public Service Board has also created the new classification of Departmental Professional Officer which could be beneficial to the Department in the future. The Public Service Association is continuing to pursue the issue of permanency for Ministerial employees within the Board of Tick Control.

Staff from the Industrial Section visited more than 30 regional establishments during the year to discuss industrial issues with staff and management.

SAFETY AND OCCUPATIONAL HEALTH

A substantial decrease in the number of accidents over the past three years demonstrates the effectiveness of the Department's Occupational Health and Safety activities. The number of claims dropped from 440 in 1985–86 to 293 in 1987–88 while the cost to the Department dropped from $1,324,000 to $312,000. In the same period, claims for repetition strain injury (RSI) fell from 41 to only 5.

Short training courses in the Occupational Health and Safety Act, Correct Lifting and Back Care, Fire Extinguisher Familiarisation, Basic Safety Management, Pesticide Safety and Basic First Aid were developed and conducted. The Training Section and Safety Section jointly trained departmental safety committees after the officers of both Sections had been accredited to conduct such training by the Occupational Health, Safety and Rehabilitation Council of NSW.

A *Safety Bulletin* was instituted to provide information about legislation, safety equipment and new safety-related products to senior and line managers and Occupational Health and Safety Committees.

Procedures for conducting Safety Audits or inspections were formulated and implemented.

MANAGEMENT AUDIT

The objectives of the Department's Internal Audit Charter continued to be met by the Management Audit and Analysis Branch but significant staff shortages resulted in a reduction in the planned number of audits. A risk analysis model has been designed to enhance audit programming and overcome audit coverage deficiencies.

Twenty-five financial, administrative and operational audits of departmental activities were undertaken at Head Office and country locations. Registration systems, regional account reconciliation procedures and the remittance of Noxious Insect Levies by Pastures Protection Boards were also reviewed.

Accounts were audited for the following:

- Potato Growers' Association of New South Wales
- Agricultural Bureau of New South Wales
- C. B. Alexander Foundation
- Tobacco Industry Trust Account
- Rural Youth Organisation
- Rural Industry Research Funds.

Officers assisted the Auditor-General at his request to verify the 1986–87 final accounts. Copies of all internal audit reports were submitted to the Auditor-General.

Despite difficulty in recruiting experienced and qualified audit staff, training continued with EDP audit methods, including the development of a computer-assisted audit system. The regional audit program, which is monitored by the Branch, operated at a reduced level during the year owing to the operational problems associated with the computerised accounting system.

In accordance with the five-year plan for reviewing and evaluating major programs and activities, two program performance reviews were conducted. These examined the provision of services in areas where fees could be recovered; that is, the Fleece Measurement Service and veterinary diagnostic services at Regional Veterinary Laboratories. The findings of these studies have been reported to management and are being examined.

Two Management Improvement Plans were implemented during the year. The first involved the complete review of delegations of authority with the view to their re-issue in a more useful format. That review has been completed but the planned abolition of the Public Service Board, from which the majority of delegations derived, has meant that further revision will be necessary before issue.

The second plan involved a major review of legislation for which the Department is responsible. This has also been completed and action is in train to repeal or amend out-dated provisions.

SENIOR STAFF CHANGES

- Dr K. P. Sheridan was appointed Director-General following the retirement of Mr G. H. Knowles.
- Dr L. J. Cook was appointed Chief, Division of Plant Industries.
- Mr G. C. File was appointed Executive Director (Research and Advisory Services).
- Dr S. G. Grimmett was appointed Executive Director (Technology and Education).
- Mr L. F. Reynolds was appointed Chief, Division of Fisheries.

CONSULTANTS

Consultants are contracted when staffing resources are unavailable or where it is considered essential to use people with specific skills or extensive experience in particular areas.

The following consultants were engaged by the Department during the year:

Price Waterhouse Urwick
Mr R. Breen
J. Makeham
Rural Development Centre, University of New England
Des Thwaites and Associates
Mr R. Harrison
J. Yang
Mr J. Hill
Kewagama Pty Ltd
Mr T. Underwood, Institute of Marine Ecology
Emperasa Pty Ltd
Mr G. Knowles
Mr W. Haines
Mr N. Sugimoto
C. McQuade
G. R. Pratt
D. Sharp
R. W. Connor
S. Mukhi
M. Abraham
Mr D. Hulme
Mr P. Rich, PRMR Enterprises Pty Ltd
Mitsui Ltd
Innovative Software
Software Management Systems Pty Ltd
Computemp Consultants Pty Ltd
Duncan Lowe
ACI
Intergrated Business
Cocam
Amos, Aked and Swift
Ms R. Suttor
Ms E. Gee
Anne Marshall

OVERSEAS TRIPS

As before, most overseas visits by officers of NSW Agriculture & Fisheries were funded by the relevant industry organisations.

Consolidated funds were used only for visits by the following:

- B. I. Mackay (deer management and market prospects, China and Hong Kong)
- A. Casey (trade improvement, Japan)
- G. H. Knowles (FAO Conference, Rome)
- E. J. Knights (chickpea markets, India)
- R. J. Wickson (frozen plum market, Japan)
- A. Ashwood (dairy cattle nutrition and farm management, New Zealand)
- R. Buesnel (dairy cattle management and herd improvement schemes, New Zealand)
- G. C. File (rabbit production, New Zealand; North American Rabbit Conference, USA; European rabbit farming and Australian Bicentenary Wool Conference promotion, UK and France).

In all cases reports were submitted. Where industry funds were provided, detailed reports were also circulated within those industries. Where it was necessary to develop specific recommendations following a course of study or visit, those recommendations were dealt with on a departmental, divisional or regional basis.

- G. B. Maguire, Research Scientist (Fisheries)—Mexico, 12 days from 6 July 1987 to represent Australia at the Australia-Mexico Conference on Tropical Marine Science.
- B. I. Mackay, Livestock Officer (Deer Production)—China, 18 days from 14 July 1987 to study deer management and evaluate export markets to China and Hong Kong.
- A. G. Kaiser, Special Livestock Research Officer—North America, Japan, South Korea and Taiwan, 35 days from 25 July 1987 to undertake a study tour of forage production technology and market requirements.
- T. L. Reilly, Senior Economist—North America, Japan, South Korea and Taiwan, accompanying Dr Kaiser.
- J. E. Searson, Special Veterinary Research Officer—Canada, 30 days from 29 July 1987 to present papers to XXIII World Veterinary Congress and to undertake study tour.
- G. P. Lamont, Senior Research Horticulturist—New Zealand, 11 days from 9 August 1987 to attend 4th International Protea Conference.
- A. C. Gleeson, Senior Research Scientist—United Kingdom and United States, 3 weeks from 15 August 1987 to attend International Statistical Conference and to investigate developments in the design of programs.
- G. C. File, Chief, Division of Animal Production—New Zealand, 3 days from 11 September 1987 to investigate rabbit farming techniques, management and administration.
- J. Allan, District Horticulturist—Europe and United Kingdom, 21 days from 11 September 1987 to attend XII International Congress on the Science and Cultivation of Edible Fungi and to investigate technology developed in Europe and the United Kingdom.
- P. Doyle, Livestock Advisory Officer—Canada and United States, 16 days from 19 September 1987. Accompanied representatives of Black and Gold Enterprises to advise on aspects of selection and purchase of breeding cattle.
- N. G. Nair, Senior Research Scientist—Europe and United Kingdom, 21 days from 19 September 1987 to attend the XII International Congress on the Science and Cultivation of Edible Fungi and to visit research institutions undertaking mushroom research.
- I. G. Ferris, Pesticide Chemist—United States, 14 days from 8 October 1987 to attend International Herbicide Workshop and review recent developments in herbicide chemistry.

* G. C. File, Chief, Division of Animal Production—United Kingdom, United States and France, 11 days from 10 October 1987 to attend North American Rabbit Conference, to investigate European rabbit production and to promote the Australian Bicentenary Wool Conference.

- A. Casey, District Livestock Officer—Japan, 15 days in November 1987 to finalise the Murray Grey feeding trial.
- J. W. Read, Principal Agronomist (Pastures)—New Zealand, 7 days from 2 November 1987 to inspect major research centres in the North Island and to attend the Annual Conference of the New Zealand Grasslands Association.

- W. J. McDonald, Special Agronomist (Pastures)—New Zealand, 7 days from 2 November 1987 with Mr Read.
- A. Ashwood, Special Livestock Officer (Dairy Cattle Nutrition and Management)—New Zealand, 12 days from 2 November 1987 to study dairy cattle nutrition and farm management practices.
- R. Buesnel, Livestock Officer (Dairying)—New Zealand, 12 days from 2 November 1987 to review dairy demonstration farm practices, to study dairy management strategies and to observe operations at the Hamilton Herd Improvement Centre.
- G. H. Knowles, Director-General—Rome, 20 days from 7 November 1987 to attend the 24th Biennial Session of the FAO Conference; China, to inspect Northern Guangdong Model Cattle Farm Project.
- D. P. Healy, Senior Research Scientist—United States, 6 months from mid December 1987 to attend Baylor College of Medicine, Texas, to develop appropriate tests for detection of citrullinaemia in Friesian cattle.
- R. Sweedman, Principal Horticulturist (Stone Fruits)—South East Asia and Japan, 28 days from mid January 1988 to investigate potential markets for dried and fresh prunes.
- B. A. Auld, Senior Research Scientist—Rome, 6 days from 6 March 1988 to attend the 7th International Symposium on the Biological Control of Weeds.
- E. Maddock, District Horticulturist (Ornamentals)—Israel and Holland, 28 days from 7 March 1988 to investigate new and advanced cut flower technology, postharvest handling and export marketing.
- R. F. Reinke, Research Agronomist (Rice Breeding)—Philippines, 12 days from 14 March 1988 to examine rice research at the International Rice Research Institute, Los Banos.
- R. Kearney, Director of Fisheries Research—New Caledonia, 6 days from 18 March 1988 to assist international scientists to formulate an operational plan for yellowfin and skipjack tagging.
- A. K. Bell, Special Livestock Officer (Sheep Nutrition)—Saudi Arabia and the United States, 10 weeks from 4 April 1988 to discuss Australian sheep and lamb exports with Saudi Arabian officials and to investigate the sheep feedlot industry in the United States.
- E. C. Scarlett, Livestock Officer (Goats)—United States, France, Scotland and Wales, 10 weeks from 4 April 1988, Churchill Fellowship to study and assess developments in intensive production of sheep and goats with emphasis on nutrition, management, housing and welfare.
- R. G. Horn, Livestock Officer (Poultry)—United States, 28 days from mid April 1988 to investigate new technology in specific aspects of modern poultry management.
- P. Kable, Principal Research Scientist—Japan, 7 days from 22 April 1988 to examine areas of Japan which produce Nashi pears and possible import protocols.
- J. D. Mullen, Senior Economist—United States, 28 days from 22 April 1988 to complete research for the Australian Wool Research and Development Council on returns to investment in research and development.
- R. W. Cook, Officer-in-Charge, Regional Veterinary Laboratory, Wollongbar—Canada, United States and United Kingdom, 65 days from 26 April 1988 to attend Exotic Disease Training Course in Canada and to visit laboratories in North America and the United Kingdom which specialise in diagnosis and research on exotic diseases.
- R. J. Wickson, Manager, Bathurst Agricultural Research Station—New Zealand, 8 days from 8 May 1988 to study techniques developed specific to the supply of frozen plums to Japan.
- R. J. Hart, Director of Animal Production Research—United Kingdom, 2 days from 19 May 1988 (whilst on a private visit) to attend meeting at Ilkley on research on environmental issues in the wool industry.
- A. J. Jessup, Research Horticulturist—United States, 5 days from 23 May 1988 to attend Research Co-ordination Meeting on the Use of Irradiation as a Treatment of Food and Agricultural Commodities.
- A. B. Blakeney, Senior Chemist—Switzerland, Italy, United Kingdom and Ireland, 6 weeks from 26 May 1988 to attend the 8th International Cereal and Bread Congress and to undertake investigations of the Italian rice industry and cereal research in the United Kingdom and Ireland.
- R. J. Barlow, Senior Research Scientist—United States and France, 15 days from 5 June 1988 to present keynote paper to the Joint Meeting of Regional Beef Breeding Committees in Nevada and to participate in

research discussions with and to deliver seminars to the scientific staff at the Nouzilly Centre for Reproductive Research.

- G. J. Lee, Livestock Research Officer—France, 5 days from 19 June 1988 to attend the 3rd World Congress on Sheep and Cattle Breeding.
- A. P. Yeates, District Livestock Officer—Japan, 18 days from 19 June 1988 to accompany cattle producers on a fact-finding mission to Japan as a technical adviser.
- K. D. Atkins, Special Livestock Research Officer—France and Scotland, 15 days from 19 June 1988 to attend and present a paper at the 3rd World Congress on Sheep and Cattle Breeding and to visit the Institute of Animal Physiology and Genetics, Edinburgh, to complete collaborative research on the statistical analysis of selection requirements.

STAFFING STATISTICS

Staff statistics as at 30 June 1988

	*Regions**							
	1	2	3	4	5	M	Other	Totals
STAFF OCCUPYING ESTABLISHED POSITIONS								
Plant Industries	95	250	120	273	278	222	0	1238
Plant Quarantine	1	2	0	1	4	103	0	111
Animal Production Services	71	85	61	73	39	50	0	379
Animal Health Services	128	70	13	35	40	162	0	448
Fish Industries, Regulatory and Management	20	39	3	21	0	44	1	128
Fish Industries, Research and Development	6	5	0	9	11	76	19	126
Support Services	38	104	28	39	75	207	0	491
SUB TOTALS	359	555	225	451	447	864	20	2921
EMPLOYMENT SCHEMES								
Technical Jobs for Women	4	1	0	0	4	3	1	13
National Employment Strategy for Aboriginals	8	4	0	3	7	0	2	24
Community Employment Program	0	2	0	1	1	3	0	7
Youth Employment Scheme	0	10	1	3	3	2	2	21
NESA Apprentices	2	0	2	0	0	0	0	4
Australian Traineeship	1	12	0	4	15	10	5	47
SUB TOTALS	15	29	3	11	30	18	10	116
Temporary employees not occupying established positions	5	16	5	13	16	98	0	153
Ministerials								
—Board of Tick Control							166	166
—Prickly Pear							30	30
SUB TOTALS	5	16	5	13	16	98	196	349
TOTALS	379	600	233	475	493	980	226	3386

These figures represent staff numbers employed as at 30 June 1988, expressed in full-time equivalent. There were also 291 vacant positions.

* See map page 7

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LEGAL SERVICES

The Legal Branch provides legal advice and administrative support to the Minister and senior executives of the Department on a wide range of matters including legislation and legislative proposals.

The Branch coordinates the legislative program, administers the Department's Statute Law Revision program and is responsible for the gazettal of notifications, appointments and proclamations under Acts administered by NSW Agriculture & Fisheries and statutory authorities responsible to the Minister for Agriculture and Rural Affairs.

The Branch is also responsible for the preparation of briefing notes, cabinet minutes, submissions to Parliamentary Counsel for preparation of Bills and speeches for the Minister's use in Parliament when introducing legislation.

LEGAL TRAINING

Legal officers provided legal training to agricultural, apiaries, poultry and stock inspectors employed by the Department, veterinary inspectors, stock inspectors and noxious animal inspectors employed by Pastures Protection Boards and weeds inspectors employed by County Councils. Courses were conducted in all regions of the State.

PROSECUTIONS

Legal Branch staff issued 86 summonses under various Acts; 16 were defended.

APPEALS

The Branch assisted in the defence of five appeals to the District Court under the Fisheries and Oyster Farms Act 1935 against decisions of the Director-General not to issue or renew commercial fisherman's licences. One of these matters has been referred to the Court of Appeal on a question of law as it is in the long-term interests of the proper administration of the Act.

AGRICULTURAL HOLDINGS DISPUTES

Legal officers chaired 2 disputes arbitrated under the Agricultural Holdings Act 1941.

SUMMARY OF LEGISLATIVE MATTERS

Legal Branch prepared 24 Proclamations, 17 Notifications, 67 appointments, various Orders and miscellaneous notices for gazettal under various Acts.

Main Acts under the administration of the Minister for Agriculture and Rural Affairs as at 30 June 1988 are as follow:

Commonwealth Acts
Quarantine Act 1908
Export Control Act 1982
Fisheries Act 1952

State Acts
Agricultural Holdings Act 1941
Agricultural Scientific Collections Trust Act 1983
Apiaries Act 1985
Banana Industry Act 1987
Biological Control Act 1985
Canned Fruits Marketing Act 1979
Cattle Compensation Act 1951
C. B. Alexander Foundation Incorporation Act 1969
Dairy Industry Act 1979
Dried Fruits Act 1939
Egg Industry Act 1983
Farm Produce Act 1983
Farrer Memorial Research Scholarship Fund Act 1980
Fisheries and Oyster Farms Act 1935
Fertilizers Act 1985
Horticultural Stock and Nurseries Act 1969
Institute of Rural Studies Act 1973
Marketing of Primary Products Act 1983
Meat Industry Act 1978
McGarvie Smith Institute Incorporation Act 1928
Non-Indigenous Animals Act 1987
Noxious Insects Act 1934
Pastures Protection Act 1934
Pesticides and Allied Chemicals Act 1978
Plant Diseases Act 1924
Potato Growers Licensing Act 1940
Poultry Meat Industry Act 1986
Poultry Processing Act 1969
Prickly Pear Act 1987
Registration of Stock Brands Act 1921
Seeds Act 1982
Stock (Artificial Breeding) Act 1985
Stock (Artificial Insemination) Act 1948
Stock (Chemical Residues) Act 1975
Stock Diseases Act 1923
Stock Foods and Medicines Act 1940
Swine Compensation Act 1928
Sydney Market Authority Act 1968
Tobacco Leaf Stabilisation Act 1967
Veterinary Surgeons Act 1986
Wheat Marketing Act 1984
Wine Grape Processing Industry Act 1979

The following regulations were gazetted:

Regulations	Gazetted
Apiaries Act 1985	1
Egg Industry Act 1983	1
Farm Produce Act 1983	2
Fisheries and Oyster Farms Act 1935	6
Horticultural Stock and Nurseries Act 1969	1
Marketing of Primary Products Act 1983	4
McGarvie Smith Institute Incorporation Act 1928	1
Meat Industry Act 1978	3
Non Indigenous Animals Act 1987	1
Noxious Insects Act 1934	1
Pastures Protection Act 1934	5
Pesticides and Allied Chemicals Act 1978	2
Prickly Pear Act 1987	2
Poultry Meat Industry Act 1986	1
Stock (Chemical Residues) Act 1975	1
Stock Diseases Act 1923	6
Veterinary Surgeons Act 1986	2
TOTAL	40

The following Acts were assented to:

Acts	Assented to
Non-Indigenous Animals Act 1987	25.11.87
Pesticides and Allied Chemicals (Amendment) Act 1987	8.12.87
Prickly Pear Act 1987	8.12.87
Miscellaneous Acts (Prickly Pear) Repeal and Amendment Act 1987	8.12.87

Minor amendments were included in the Government's Statute Law Revision Program.

Amendments to the following Acts were included in the Statute Law (Miscellaneous Provisions) Act (No. 2) 1987:

- Canned Fruits Marketing Act 1979
- Farm Produce Act 1983.

Repeals. The following Acts were repealed as they are no longer of public utility:

Native Dogs Destructions and Poisoned Baits Act 1901 (1902 No. 19)
Red Cross War Chest Farm Colony Transfer Act 1924 No. 5
Flour Acquisition Act 1931 No. 10
Flour Acquisition (Amendment) Act 1931 No. 50
Wheatgrowers Relief Act 1932 No. 60
State Cannery (Sale) Act 1935 No. 38
Wheat and Wheat Products Act 1936 No. 3
Wheat Growers Relief Act 1936 No. 9
Wheat Products (Prices Fixation) Act 1938 No. 19
Wheat Industry Stabilization Act 1938 No. 32
Wheatgrowers Relief Act 1941 No. 4
Cereal Growers Drought Relief Act 1944 No. 33
Cattle Compensation Taxation Act 1962 No. 24
Division IV of Part III of the Cattle Compensation Act 1951
Wheat Quotas Act 1969 No. 53
Wheat Industry Stabilization and Wheat quotas (Amendment) Act 1969 No. 74
Wheat Quotas Act 1970 No. 66
Wheat Quotas Act 1971 No. 76
Wheat Quotas Act 1972 No. 67
Wheat Quotas Act 1973 No. 89
Wheat Quotas Act 1975 No. 17

Non-Indigenous Animals Act 1987. The purpose of this legislation is to provide control over the importation, keeping and movement of classified exotic animals and birds that could pose a threat to agriculture, the environment or the public. Legislation already exists to control animals kept for public exhibition in zoos and circuses under the Exhibited Animals Protection Act 1986, but that Act does not control the keeping of non-indigenous vertebrate animals, birds or reptiles in private collections, or the movement of animals into or within NSW.

The Commonwealth Quarantine Act has in the past been used to restrict the entry into Australia of some species of non-indigenous animals and to maintain continued control over those that were allowed in. However, in anticipation of the Commonwealth withdrawing existing controls, the Non-Indigenous Animals Act 1987 was passed and assented to on 25 October 1987.

Animals not indigenous to Australia will be classified according to species. Category 1 and 2 animals will comprise animals posing a major threat to agriculture or the environment, or animals posing a threat to the health or safety of people. These animals require the strictest security. Consequently the Act in part imposes penalties of $10,000 or imprisonment for 6 months or both for the offence, if proved, of importing, keeping, moving or transporting an animal without first obtaining a permit or licence.

Category 3 will comprise animals requiring less onerous controls to limit their pest potential. A penalty of $2000 is imposed for offences in relation to these animals.

The Act also provides for the constitution of a Non-Indigenous Animals Advisory Committee to advise the Minister as to the proper classification of animals for the purposes of the Act.

Other provisions in the legislation are of a general nature. They enable the Minister to require returns to be furnished by licensees and require those in charge of travelling circuses and other itinerant shows to furnish details of the itinerary of such shows.

The administration of this legislation will be carried out by NSW Agriculture & Fisheries with the services of inspectors appointed under the Exhibited Animals Protection Act.

Prickly Pear Act 1987. This Act provides for the control and destruction of prickly pear in the State, under the administration of the Director-General of Agriculture instead of the Prickly-pear Destruction Commissioner.

The Prickly-pear Destruction Commission has been in existence since 1925 and was until 1975 attached to the Department of Lands. In 1975 the Commission came under control of the Minister for Agriculture because the leasing of prickly-pear-infested land ceased and the Commission's operation became concerned more with control of prickly pear rather than leasing of infested land.

Since 1978 the main thrust of the prickly pear control policy has changed from chemical control to biological control. A major policy of NSW Agriculture & Fisheries is to research and use alternative techniques to chemical control. The change in emphasis and success of the biological control program has allowed a reduction in staff and activities of the Commission.

Cognate with the Prickly Pear Act 1987 is the Miscellaneous Acts (Prickly Pear) Repeal and Amendment Act 1987. This Act repeals the Prickly-pear Act 1924 and amends certain other Acts as a result of the enactment of the new Prickly-pear Act 1987.

Pesticides and Allied Chemicals (Amendment) Act 1987. The main object of this amendment was to increase the maximum penalties for all offences against the Pesticides and Allied Chemicals Act 1978 and the regulations made under that Act.

Misuse of pesticides is a serious matter and the gravity of the offence is reflected in the penalties imposed. The new maximum penalties for major offences under the Act have been increased to $20,000 for individuals (previously $500) and $40,000 for corporations (previously $20,000). These maximum penalties will apply to the sale and use of unregistered pesticides.

The maximum penalties for lesser offences, such as providing misleading information, are now $5,000 compared with $500 to $2000 previously. The maximum penalty for breaches of the Regulation is $2,000.

The amendments to the Act come in the wake of recent problems encountered with Australian beef exports to the United States and illustrate the serious impact of unacceptable pesticide residues on international markets worth $1700 million annually.

These new fines are the toughest imposed by any state. The increases bring the penalties in line with those imposed under the Environmentally Hazardous Chemicals Act 1985 which controls the environmental effect of chemicals and chemical wastes, including pesticides.

The amendments also enable proceedings for offences to be brought before either the Local Court or the Land and Environment Court.

FARRER MEMORIAL TRUST

FARRER MEMORIAL RESEARCH SCHOLARSHIP FUND

The Farrer Memorial Trust was established in 1911 to perpetuate the memory of William James Farrer and to encourage and inspire agricultural scientists. Initially it awarded scholarships for 'study or research in agricultural problems'. Later it included the delivery of an annual oration and the presentation of the Farrer Memorial Medal to a distinguished agricultural scientist for service rendered in the fields of research, education or administration.

The Director-General of NSW Agriculture & Fisheries, Dr K. P. Sheridan, is the Chairman of the Trust. The other official Trustees are: Mr G. R. Gregory, Deputy Director-General of the Department; Professor B. Fisher, Dean of the Faculty of Agriculture, University of Sydney; and Dr F. G. Swain, Principal, Hawkesbury Agricultural College. The non-official Trustees, representing industry, are: Mr G. McCorquodale, Executive Director, NSW Flour Millers' Council; Mr H. R. M. Ross, 'Glengarry', Springside via Orange; and Mr P. E. B. MacInnes, 'Warringa', Dubbo.

The 1987 Farrer Memorial Medal was awarded to Professor John Dillon, Faculty of Agricultural Science, University of New England, and was presented at a function held at the University of New England on 17 September 1987. Professor Dillon delivered the Farrer Memorial oration entitled 'Population Resources and Food: The World between Today and Tomorrow'.

Mr Brett Summerell, the 1985 Farrer Memorial Scholar, completed his research at the University of Sydney for the degree of Doctor of Philosophy. The subject of his research was the effect of physical factors and cultivar type on the decomposition of wheat stubble and its relationship to the survival and ecology of the yellow spot fungus in reduced tillage systems. Mr Summerell has submitted his thesis for examination.

A donation of $1,625.20 from the NSW Flour Millers' Council was received to meet part of the scholarship allowance expenditure.

The Trust's postal address is the Secretary, Farrer Memorial Trust, c/o NSW Agriculture & Fisheries, P.O. Box K220, Haymarket, NSW 2000.

TRUSTEES OF THE FARRER MEMORIAL RESEARCH SCHOLARSHIP FUND

AUDITOR-GENERAL'S CERTIFICATE

The accounts of the Trustees of the Farrer Memorial Research Scholarship Fund for the year ended 31 December 1987 have been audited as required by Section 45(1) of the Public Finance and Audit Act 1983 and in accordance with Section 34 of that Act.

In my opinion, the accompanying balance sheet, income and expenditure and funds statements, read in conjunction with the notes thereto, exhibit a true and fair view of the financial position at 31 December 1987, and transactions for the year then ended.

K. J. Robson, FASA CPA
Auditor-General of
New South Wales

Sydney
18 March 1988

STATEMENT IN ACCORDANCE WITH SECTION 41B(1)(f) OF THE PUBLIC FINANCE AND AUDIT ACT 1983

Pursuant to Regulation 11 of the Public Finance and Audit (Statutory Bodies) Regulation 1985, we state that:

a. the financial statements and notes thereon exhibit a true and fair view of the financial position and transactions for the year ended 31 December 1987;
b. the financial statements have been prepared in accordance with the provisions of the Act, Regulation and Treasurer's Directions;
c. we are not aware of any circumstances which would render any particulars included in the financial statements to be misleading or inaccurate.

K. P. SHERIDAN
Chairman
Farrer Memorial Trust

G. R. GREGORY
Trustee

Sydney
10 February 1988

BALANCE SHEET AS AT 31 DECEMBER 1987

1986 $		1987 $	$
	Capital		
95,822	Balance as at 1 January 1987	112,022	
16,200	Donations received (Note 2)	4,000	116,022
	Retained earnings		
36,619	Accumulated funds		49,125
148,641			165,147
	Represented by—		
132,700	Investments at cost (Note 3)		136,700
	Current assets		
195	Medal stocks (at cost)	162	
4,731	Accrued interest	5,154	5,316
	Cash at bank		
1,207	Commonwealth Savings Bank	5,370	
9,598	Advance Bank investment account	17,537	
210	Advance Bank passbook account	224	23,131
148,641			165,147

P. Anquetil
Hon. Secretary
Farrer Memorial Trust
10 February 1988

INCOME AND EXPENDITURE ACCOUNT AS AT 31 DECEMBER 1987

1986 $		1987 $
	Income	
16,166	Interest from investments	18,634
813	Interest from cash at bank	1,113
1,625	Donations (Note 2a)	1,625
18,604		21,372
	Expenditure	
8,581	Cost of scholarship	8,206
452	Oration expenses	647
30	Bank charges	14
9,063		8,867
9,541	Excess of income over expenditure	12,505
18,604		21,372

STATEMENT OF SOURCES AND APPLICATION OF FUNDS AS AT 31|DECEMBER 1987

1986 $		1987 $	1987 $
	Source of funds		
	Funds from operations—		
	Inflows of funds from operations		
16,979	Interest from investments and bank accounts	19,747	
1,625	Donations	1,625	
18.604			21,372
	Outflows of funds from operations		
9,063	Expended in the provision of scholarship and oration expenses, bank charges	8,867	
9,541			12,505
	Reduction in assets		
	Current assets		
(32)	Medal stocks		(33)
	Increase in liabilities		
	Non-current liabilities		
16,200	Capital		4,000
25,773			16,538
	Application of funds		
	Increase in assets		
	Current assets		
1,400	Accrued interest	422	
(1,327)	Cash at bank	12,116	
73			12,538
	Non-current assets		
25,700	Investments		4,000
25.773			16,538

INVESTMENTS AS AT 31 DECEMBER 1987

Investment	Interest Rate	Maturity Date	Amount $	
Australian Resources Development Bank transferable deposit	12.25%	31.3.89	7,200	7,200
Primary Industry Bank of Australia IBD	13.00%	31.3.89	8,000	8,000
Commonwealth Development Bank of Australia Ltd CDB investment	13.5%	7.7.89	16,000	
CDB investment	15.00%	9.4.89	15,000	31,000
State Bank of NSW Loan No. 10	5.375%	31.10.93	2,000	2,000
NSW Treasury Corporation				
Premier State Bonds	14.3%	1.10.88	33,000	
Premier State Bonds	14.3%	1.10.88	5,000	
Premier State Bonds	15.0%	1.3.88	21,000	
Premier State Bonds	15.0%	1.3.88	4,000	
Premier State Bonds	13.5%	1.3.90	15,000	
Premier State Bonds	13.25%	1.3.88	2,500	
Premier State Bonds	15.6%	1.7.93	3,000	
Premier State Bonds	12.5%	1.11.91	5,000	88,500
				$136,700

1. SUMMARY OF ACCOUNTING POLICIES:

NOTES TO AND FORMING PART OF THE ACCOUNTS FOR THE YEAR ENDING 31 DECEMBER 1987

a. The accompanying financial statements have been prepared on an accrual basis in accordance with historical cost principles, having regard to current Australian accounting standards.

b. The financial statements have been prepared in accordance with the requirements of Section 41B(1) of the Public Finance and Audit Act 1983.

c. Policies adopted are consistent with those applied in the previous year.

d. All administration costs (including salary and wages) are met directly from the Consolidated Fund allocation to the Minister for Agriculture and Rural Affairs. Such costs are estimated to be $2,025 for the year.

e. Except that no provision is made for the value of accrued long service and annual leave, no material amounts were owed to or by the fund as at 31 December 1987. Long service leave and annual leave are paid out of Consolidated Fund appropriations when such leave is taken. There is no superannuation liability as at 31 December 1987.

2. DONATIONS RECEIVED AND ADDED TO THE CAPITAL ACCOUNT WERE:

Wheat Industry Research Committee of NSW	$4,000

a. An amount of $1,625.20 was donated by the NSW Flour Millers' Council and paid direct to the Scholarship holder, Mr B. Summerell, to meet part of his scholarship allowance.

b. The conditions relating to the donation from the Wheat Industry Research Committee are such that the donation must be expended in the areas of salaries, operating expenses or capital. As there are no salaries paid by the Trust and operating expenses are met from interest received on the investment of capital then the donation is credited to the Capital Account.

c. Investments in public authorities and term deposits are valued at cost and market value and are held to maturity. All investments are quoted on the Sydney Stock Exchange.

1986			1987	
Cost Value $	Market Value		Cost Value $	Market Value $
12,200.00	12,200.00	Australian Resources Development Bank	7,200.00	7,392.24
31,000.00	31,000.00	Commonwealth Development Bank of Australia	31,000.00	33,168.80
76,500.00	76,175.31	NSW Treasury Corporation	88,500.00	93,084.75
2,000.00	1,229.16	State Bank of NSW	2,000.00	1,397.20
8,000.00	8,000.00	Primary Industry Bank of Australia	8,000.00	8,308.80
3,000.00	3,132.18	State Electricity Commission	0	0
132,700.00	131,736.65		136,700.00	143,351.79

THE AGRICULTURAL SCIENTIFIC COLLECTIONS TRUST

The activities of the Agricultural Scientific Collections Trust were previously reported separately.

The Act provides statutory protection for the important scientific collections of NSW Agriculture & Fisheries, and ensures their long-term maintenance and improvement. At present, there are two collections: the Plant Pathology Branch Herbarium; and the Entomology Branch Insect and Mite Collection. Both are housed at the Biological and Chemical Research Institute, Rydalmere. They are used in research work on the taxonomy and identification of insects, mites, fungi and other microorganisms harmful to plants, and in providing day-to-day advice on the identification, host range and geographic distribution of these organisms.

Trust members are appointed by the Minister for Agriculture and Rural Affairs for five years. The Chairman of the Trust is Mr G. C. File, Executive Director (Research and Advisory Services), NSW Agriculture & Fisheries. The Director of the Collections is Mr J. Walker, Principal Research Scientist, and Curator, Plant Pathology Branch Herbarium, NSW Agriculture & Fisheries. The Secretary is Dr E. Schicha, Senior Research Scientist, and Curator, Entomology Branch Insect and Mite Collection, NSW Agriculture & Fisheries. Other Trustees are Mr M. Casimir, Director, Biological and Chemical Research Institute, NSW Agriculture & Fisheries; Dr D. Hales, Senior Lecturer, School of Biological Sciences, Macquarie University; and Dr P. G. Valder, Senior Lecturer, School of Biological Sciences, University of Sydney.

The address of the Trust is the Director, Agricultural Scientific Collections Trust, Biological and Chemical Research Institute, NSW Agriculture & Fisheries, Cnr Victoria Road and Pemberton Street, Rydalmere, NSW 2116.

RESEARCH

PLANT PATHOLOGY HERBARIUM

Mr J. Walker examined herbarium specimens and prepared part of the final manuscript for *The Plant Diseases and Plant Pathogens of New South Wales: An Annotated Index.* The fungus *Ceratocystis fimbriata* was recorded in Australia for the first time on the ornamental plant *Syngonium.* Mr M. J. Priest's major work on the genus *Pisolithus* continued (in cooperation with Dr. N. Malajczuk, CSIRO Division of Forest Research) and most of the Australian collections of this genus have now been examined.

ENTOMOLOGY COLLECTIONS

The manuscript of a book on the Phytoseiidae of the Philippines was prepared by Dr Schicha in cooperation with Dr L. A. Corpuz Raros of the Philippines. The entire collection of Philippine Phytoseiidae of about 500 specimens was posted to the Arthropod Collection at Rydalmere.

Cooperation with Dr D. O'Dowd, Lecturer in Zoology at Monash University, Victoria, on the role of acarodomatia on leaves of woody angiosperms was extremely beneficial. His collection of plant mites provides a better insight into the mite fauna of Australian native plants from outside NSW.

Research by Dr M. J. Fletcher into the taxonomy of the subfamilies Deltocephalinae and Typhlocybinae (Hemiptera, Cicadellidae) continued. A paper on the status of the Kirkaldy type material of these two subfamilies is in preparation.

Dr Fletcher also revised the sections in *The Australian Encyclopaedia* dealing with Hemiptera, Insects and Aphids.

Two papers on Cicadellidae were published during the year. The major one, published jointly with Mr M. Stevens, Sydney University, provides a key to the subfamilies and tribes of Australian Cicadellidae and was produced to complement the new edition of *The Insects of Australia* currently in preparation. Two further publications, one on Cicadellidae and one on the Australian genera of Flatidae, were accepted by journals.

Research by Mr G. Brown into the hymenopterous family Tiphiidae continued. A revision of the genus *Doratithynnus* is in press, and manuscripts revising the genera *Encopothynnus* and *Rhagigaster* are in preparation.

IDENTIFICATION AND ADVISORY WORK

PLANT PATHOLOGY HERBARIUM

Over 900 routine identifications were made during the year. Detailed statements on plant parasitic fungi were also prepared for Plant Quarantine.

ENTOMOLOGY COLLECTIONS

Identifications of 1609 insect, mite, spider, mollusc and other invertebrate samples were made. Of these, 308 were from quarantine interceptions, and about 60 per cent of the total were submitted by departmental officers. A further 2354 specialist identifications were made for other state departments, CSIRO and overseas workers.

CURATION OF THE COLLECTIONS

PLANT PATHOLOGY HERBARIUM

Over 1000 collections were added to the Herbarium, bringing the total held to over 74 000. Some 120 specimens were sent on loan to local and overseas workers. Cultures are now being sold at the discretion of the Director.

ENTOMOLOGY COLLECTIONS

A total of 3791 dry-pinned insect specimens, 23 alcohol samples and 594 slide-mounted insects and mites were added to the collections. There were 10 requests for loans from specialist entomologists, representing 1431 specimens. Reorganisation and updating of the collections continued.

EVALUATION OF BIOLOGICAL CONTROL AGENTS

Eleven proposals by scientists to the Commonwealth Department of Primary Industries and Energy concerning the testing in quarantine or release of biological control agents were investigated.

STATEMENT BY MEMBERS OF THE TRUST

Pursuant to Section 41B(1)(f) of the Public Finance and Audit Act, 1983, and in accordance with a resolution of the members of the Agricultural Scientific Collections Trust, we declare on behalf of the Trust that in our opinion:

1. The accompanying financial statements exhibit a true and fair view of the financial position of the Trust as at 30 June 1988, and transactions for the year then ended.
2. The statements have been prepared in accordance with the provisions of the Public Finance and Audit Act 1983, the Public Finance and Audit (Statutory Bodies) Regulation 1985 and the Treasurer's directions.
3. In the interval between the end of the financial year and the date of these financial statements no item, transaction or event of a material and unusual nature has arisen which is likely, in the opinion of the members of the Trust, to substantially affect the results of the Trust's operations for the next financial year.

J. WALKER
Director
Agricultural Scientific Collections Trust

E. SCHICHA
Secretary

15 August 1988

AUDITOR-GENERAL'S CERTIFICATE

The accounts of the Agricultural Scientific Collections Trust for the year ended 30 June 1988 have been audited in accordance with Section 34 of the Public Finance and Audit Act 1983.

In my opinion, the accompanying balance sheet, income and expenditure and funds statements, read in conjunction with the notes thereto, comply with Section 41B of the Act and exhibit a true and fair view of the financial position at 30 June and transactions for the year then ended.

K. J. ROBSON, FASA CPA
Auditor-General of New South Wales

Sydney
14 October 1988

BALANCE SHEET AS AT 30 JUNE 1988

1986–87 $		Notes	1987–88 $
	Current assets		
8,198	Cash at Treasury		9,988
8,198	**Total current assets**		9,988
	Non-current assets		
2,857	Plant and equipment	(2.3)	2,642
2,857	**Total non-current assets**		2,642
11,055	**Total assets**		12,630
–	**Current liabilities**		–
–	**Total liabilities**		–
11,055	**Net assets**		12,630
	Capital and retained earnings		
11,055	Accumulated Funds	(5)	12,630
11,055	TOTAL CAPITAL AND RETAINED EARNINGS		12,630

STATEMENT OF INCOME AND EXPENDITURE FOR THE YEAR ENDED 30 JUNE 1988

1986–87 $		Notes	1987–88 $
	Income		
	Consolidated Fund appropriation		
	Minister for Agriculture & Rural Affairs—		
15,000	**Other services**	(1.2)	**15,000**
–	Sale of cultures	(3.1)	2,125
15,000			17,125
	Expenditure		
4,671	Miscellaneous stores		10,384
1,673	Minor plant and equipment		323
222	Books		3,743
–	Fees for services rendered		614
36	Printing		254
200	Travel expenses		17
373	Depreciation	(2.2)	215
7,175			15,550
7,825	Operating surplus		1,575

STATEMENT OF SOURCES AND APPLICATION OF FUNDS FOR THE YEAR ENDED 30 JUNE 1988

1986–87 $		Notes	1987–88 $
	Sources of funds		
	Funds from operations—	(1)	
15,000	Inflow of funds		17,125
6,802	Outflow of funds		15,335
8,198			1,790
	Application of funds		
	Increase in assets—		
	Current assets—		
8,198	Cash at Treasury		1,790
8,198			1,790
	(1) *Reconciliation of operating surplus with funds from operations*		
7,825	Operating surplus		1,575
373	Add: depreciation		215
8,198			1,790

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS FOR THE YEAR ENDED 30 JUNE 1988

1. GENERAL

1.1 The 'Trust' is constituted under Section 5 of the Agricultural Scientific Collections Trust Act 1983, which was proclaimed to commence from 9 November 1984. This Act gives statutory protection to the scientific collections of NSW Agriculture & Fisheries, ensuring their long-term maintenance and improvement. At the present time, the only two collections vested in the Trust are the Plant Pathology Branch Herbarium and the Entomology Branch Insect and Mite Collection, both located at the Biological and Chemical Research Institute, Rydalmere.

1.2 The Trust operates from an annual Consolidated Fund appropriation to the Minister for Agriculture and Rural Affairs which is transferred to a Special Deposits account for operating purposes.

1.3 Operations of the Trust are carried out by officers of NSW Agriculture & Fisheries and no salaries, wages or overhead costs are charged to or paid by the Trust. It is not possible to reasonably estimate the value of material expenditure incurred by the Department in direct support of the Trust due to the number of staff who have some input into the maintenance of the collections and the interrelationship with normal departmental duties.

2. ACCOUNTING METHODS AND POLICIES

2.1 The financial statements for the year ending 30 June 1988 have been prepared on an accrual and historical cost basis in conformity with Australian Accounting Standards and with Section 41B of the Public Finance and Audit Act, 1983, to exhibit a true and fair view of the financial position and transactions of the Trust.

2.2 Depreciation of non-current assets has been calculated on the straight line method using appropriate rates, having regard to the estimated useful life of the various assets.

2.3 Plant and equipment owned by the Trust has been defined in accordance with the Treasurer's directions, issued from time to time, and takes into consideration the cost and anticipated life of the respective items.

3. CHANGES IN ACCOUNTING POLICY

3.1 During 1987–88 the Trust began charging for the sale of living cultures of fungi and bacteria. Previously no charge was levied for these services.

4. DEBTS, RECEIVABLES, CONTINGENT LIABILITIES AND AUDIT FEES

4.1 No receivables were owing to the Trust as at 30 June 1988.

4.2 There were no contingent liabilities in respect of the Trust as at 30 June 1988.

4.3 No audit fees were charged for 1987–88.

4.4 The Trust operates from premises provided free of service charges by NSW Agriculture & Fisheries at the Biological and Chemical Research Institute, Rydalmere. Rental charges, if payable, are estimated to be $35,000 per annum.

4.5 There were no outstanding debts by the Trust at the end of the year.

5. ACCUMULATED FUNDS

1986–87 $		1987–88 $
–	Accumulated Funds at 1 July	11,055
7,825	Operating Surplus for year	1,575
3,230	Major Plant and Equipment expended in previous years and now capitalised	–
11,055	Accumulated Funds at 30 June	12,630

FINANCIAL STATEMENTS

STATEMENT BY DIRECTOR-GENERAL

Pursuant to Clause 8 of the Public Finance and
Audit (Departments) Regulation 1986, I state that:

a. The accompanying financial statements have been prepared in accordance with the provisions of the Public Finance and Audit Act 1983, the Public Finance and Audit (Departments) Regulation 1986, and the Treasurer's Directions.
b. The statements present fairly the receipts and payments of that part of the Consolidated Fund, and those accounts in the Special Deposits Account operated by the Department.
c. There are no circumstances which would render any particulars included in the financial statements to be misleading or inaccurate.

K. P. SHERIDAN
Director-General

AUDITOR-GENERAL'S CERTIFICATE

DEPARTMENT OF AGRICULTURE AND FISHERIES

The accounts of the Department of Agriculture and Fisheries for the year ended 30 June 1988, have been audited in accordance with Section 34 of the Public Finance and Audit Act 1983.

In my opinion, the accompanying summarised receipts and payments statements and statement of special deposits account balances, read in conjunction with the notes thereto, comply with Section 45E of the Act and are in accordance with the accounts and records of the Department.

K. J. ROBSON, FASA CPA
Auditor-General of New South Wales

Sydney
11 October 1988

NOTES TO FINANCIAL STATEMENTS

NOTE 1. ACCOUNTING METHODS AND POLICIES

a. The Financial Statements have been prepared on a program budgeting basis. The Department's receipts and payments figures are shown under seventeen program headings. In those instances where financial details were not dissected into programs, transactions have been included under the 'non-program' heading.

b. The financial statements of the Department have been prepared on a cash accounting basis, with the exception of payments for salaries which are reported on an accrual accounting basis.

c. The financial details provided in Tables A, B and D relate to the transactions of both the Consolidated Fund and the Special Deposits Accounts.

d. The financial data has been presented in the following format:

   i. Table A—represents details on a line item basis of all receipts and payments of the Consolidated Fund and Special Deposits Accounts,

   ii. Table B—represents summarised receipts and payments of the Consolidated Fund and Special Deposits Accounts on a program basis;

   iii. Table C—represents balances of Special Deposits Accounts as at 30.6.88;

   iv. Table D—represents a broad heading details of receipts and payments of the Consolidated Fund and Special Deposits Accounts dissected on a program basis.

e. A reference in the receipts and payments statements to an 'estimate' figure means:

   i. in the case of a special appropriation the amount included in the estimates in respect of that appropriation; and

   ii. in the case of an annual appropriation the amount appropriated in the relevant Appropriation Act as advised by the Treasury.

f. A reference in the receipts and payments statement to an 'actual' figure means the payments actually made by the Department (subject to (i) below) in respect of the item to which it refers with the exception of the payment for salaries which are reported on an accrual basis as per (b) above.

g. Estimates for Special Deposits Account receipts and payments are not prepared by the Department and not shown within the financial statements.

h. Special Deposits Account expenditures have been recorded on a line item basis, and are included with Consolidated Fund Recurrent Payments expenditure items within Table A.

i. In 1987–88 the Department introduced measures to eliminate instances where receipts and payments were offset within Special Deposits Accounts. This new practice has not been fully implemented and some accounts in 1987–88 are still distorted by receipts and payments being offset leaving a net figure represented as either a receipt or a payment in the financial statements. The Department has revised its Chart of Accounts for the 1988–89 year and it is anticipated that the new classifications introduced will facilitate separate accounting for all receipts and payments.

NOTE 2. TRANSFER OF CONSOLIDATED FUND GRANTS AND COMMONWEALTH GRANTS TO SPECIAL DEPOSITS ACCOUNTS

An amount of $8,684,564, representing Consolidated Fund Grants and Commonwealth Grants, was transferred from the Consolidated Fund Recurrent Payments account to the Special Deposits Account. These Receipts are not included in the Special Deposits Accounts collection items and total Departmental payments are finally reduced by transfers. The treatment of these inter-fund transfers ensures that only net program receipts and net program payments are disclosed.

NOTE 3. AMOUNTS DUE AND UNPAID FOR GOODS AND SERVICES RECEIVED

	1987–88	1986–87
TOTAL VALUE	**$1,555,474**	$1,408,191

The amount shown is an estimate calculated on the basis of actual unpaid vouchers on hand as at 3

NOTE 4. OUTSTANDING COMMITMENTS AS AT 30 JUNE 1988

	1987–88 $'000	1986–87 $'000
Capital works and services (contractual commitments)*	**18,983**	8,511
Goods and services	**905**	816
Lease/hire	**nil**	nil
	19,888	9,327

* Brackish Water Fish Culture Research Station, Salamander Bay	65	–
Elizabeth Macarthur Agricultural Institute, Camden Park	17,214	–
C. B. Alexander Agricultural College—extensions	361	–
Biological and Chemical Research Institute–fire hazard prevention	977	–
Cattle Tick Laboratory—stage 1n	162	–
Bathurst fisheries cottage	3	–
Fisheries offshore vessel	201	–

NOTE 5. SCHEDULE OF REPAYABLE AMOUNTS OWING ON PUBLIC BORROWINGS AND OTHER REPAYABLE ADVANCES

a. *1968–69 Advance of $50,600*

Loan period of 30 years @ $1,686.67 repayable per annum.

Purpose of Advance: To provide for the increased cost of construction of tourist facilities within Fisheries complexes. Balance owing on Capital Debt 30.6.88—$18,553.27 (Balance 30.6.87—$20,239.94).

b. *1971–72 Advance of $120,000*

Loan period of 30 years @ $4,000.00 repayable per annum. Purpose of Advance: To assist in establishing a Research and Experimental Station at Narrandera. Balance owing on Capital Debt 30.6.88—$56,000 (Balance 30.6.87—$60,000).

Interest paid on above loans $9,190.00 1987–88 ($9,750.00 1986–87).

c. *1978–79 Advance of $11,000*

Loan period of 15 years @ $1,225.92 repayable per annum. Purpose of Advance: Installation of irrigation plant at Bega Dairy Demonstration Farm. Balance owing on Capital Debt 30.6.88—$5,499.98 (Balance 30.6.87- $6,416.65).

d. *1978–79 Advance of $1,000*

Loan repayable at Department's discretion. Purpose of Advance: To provide working capital to facilitate the purchase and sale of milk meter brackets in connection with Herd Recording Scheme. Balance owing on Capital Debt 30.6.88—$1,000.00 (Balance 30.6.87—$1,000.00).

e. *1958–59 Advance of $20,000*

Loan repayable at Department's discretion. Purpose of Advance: To permit the purchase of cattle and sheep for the control of weeds and pastures at Departmental Institutions. Balance owing on Capital Debt 30.6.88—$20,000.00 (Balance 30.6.87—$20,000.00).

NOTE 6. CONTINGENT AMOUNT PAYABLE TO THE DEPARTMENT

Meat Inspection Fees—$3,700,258.07. Such fees have been outstanding for many years.

The Department, through the State Crown Solicitor's Office, has initiated legal action against one firm as a test case to prove the legality of the fees. The case has not yet come before the Court.

So as not to jeopardise the Department's legal rights in relation to other debtors, under Section 14 of the Limitation Act 1969 the Department has referred all debtors to the State Crown Solicitor's Office for initiation of legal recovery action.

Notwithstanding action taken by the Department and the State Crown Solicitor's Office to prevent the debts becoming Statute Barred, debts to the value of $477,002 have become Statute Barred and deemed irrecoverable. A further $18,571 has been recommended by the State Crown Solicitor's Office for write-off.

NOTE 7. SCHEDULE OF DEBTS WRITTEN OFF—YEAR ENDED 30 JUNE 1988

The following is a list of debts written off during the year ended 30 June 1988.

Description	1987–88	1986–87
		$
Oyster lease rental	471	174
Apiaries Act—licence renewal	42	47
Artificial stock breeding fees	327	693
Seed testing	333	13
Overpayment of salary	2,559	951
Prickly Pear Destruction Commission	256	435
Removal of diseased fruit trees	–	665
Hire of cattle yards	–	22
Emergency tail tag fees	52	–
Plant Diseases Act fees	625	–
Overpayment—Drought Fodder Subsidy	309	–
Publications	13	–
Inland angling licences	151	–
Board of Tick Control services	41	–
Telephone charges	443	–
TOTAL	$5,622	$3,000

NOTE 8. SALARIES AND WAGES EXPENDITURE

Salaries and wages expenditure shown for both 1986–87 and 1987–88 funded from the Consolidated Fund includes the full year's costs. The amount of $1,568,895.84 was transferred to Special Deposits Account No. 1140 representing 7/14ths of the salary costs for the pay period commencing 24 June 1988.

NOTE 9. CAPITAL WORKS AND SERVICES

Details of expenditure on Capital Works and Services are listed on Table A.5.

NOTE 10. SCHEDULE OF UNCOLLECTED AMOUNTS AS AT 30 JUNE 1988

Schedule A details all uncollected amounts as at 30 June 1988 totalling $789,132 ($368,283 30.6.87). Appropriate action is currently being undertaken to ensure full recovery of all debts.

NOTE 11. AUDIT FEES

The fees for auditing NSW Agriculture & Fisheries for the year ended 30 June 1988 was $84,700 ($79,500 1986–87). The Auditor received no other benefits.

NOTE 12. OTHER SERVICES

It is estimated that the cost of Other Services provided and not met from the Department's Budget Allocation, totalled $8,293,000 in 1987–88. Details of such are as follows:

	1987–88 $'000	1986–87 $'000
Rent (Based on rental accommodation as supplied by PSB Office Accommodation Bureau)	998	948
Payroll Tax (based on the calculation of 6% of the total assessable expenditure of $82,630,671)	4,958	4,715
Government Cleaning Service (based on estimate from Government Supply Department	1,560	1,803
Repairs, maintenance and mewals, public buildings fitouts etc. (based on figures determined by Public Works Department)	777	393
TOTAL	18,293	7,859

In addition, the State Crown Solicitor's Office has assisted on legal matters, and the Government Printing Office (located in various Government Office Buildings) provided printing and copying facilites. The cost of these services has not been assessed.

NOTE 13. RECEIPTS—CONSOLIDATED FUND

Revenue banked by the Department into the Consolidated Fund totalled $15,378,000 ($13,207,000—1986–87). This was dissected as follows:

a. Receipts for services rendered	$3,713,000

Revenue from rental of departmental cottages, student fees for departmental agricultural colleges, and various fees received for registration and licence renewals for the various Statutes administered by the Department.

b. Commonwealth contributions	$6,442,000

These represent contributions by the Commonwealth Government for work carried out by this Department on their behalf under the provisions of Commonwealth legislation:

Plant Quarantine Services	$3,408,000
Commerce (Trade Descriptions) Act	$1,497,000
Animal Quarantine Services	$939,000
Commonwealth Fisheries	$381,000
Animal Export Services	$317,000
c. Miscellaneous receipts	$1,873,000
d. Other receits	$3,350,000

NOTE 14. DEPOSIT ACCOUNT BALANCES HELD AND INACTIVE FOR MORE THAN 2 YEARS

Account description	Amount	Particulars
Contribution towards red scale research	$229.50	
Relevant action to be initiated to clear account		
East Coast trawler patrols	$1,670.80	" "
Contribution towards mushroom research	$538.00	" "
Donation by IREC— salary expenses	$1,024.67	" "
Overseas visit—C. J. Rigney	$216.36	" "
Short course—Agriculture Remote Sensing	$778.75	" "
Aquatic research—draft management plan	$(784.99)	" "
Tyres and Tubes Account	$(437.28)	" "
Electricity Commission of NSW —survey power site:		
Mt Piper	$1,517.80	" "
Olney	$1,807.03	" "
Apsley	$1,908.93	" "
Foybrook	$1,378.47	" "
Clostridial disease vaccination program	$559.46	" "
CSRG—plant nutrition research	$4,409.35	" "
Argentine ant research	$23.28	" "
Grown citrus nursery training	$.79	" "
Anthelmintic resistance survey	$362.98	" "
Energy conservation tillage operation	$495.09	" "
CSRG—oat breeding	$2.52	" "
RCDF—improve table	$1,186.02	" "
RCDF—crop disease management	$(345.81)	" "
Economic Model Cattle Industry Project	$108.13	" "
Molasses growing pigs	$48.21	" "
Wool Scholarship collections	$2,443.00	" "
Short course 2—Advisory Appraisal Group	$95.00	" "
Short course 3—Bee School	$43.32	" "
Short course 8—Pesticide Training	$119.30	" "
Short course 15—Poultry Health	$(176.60)	" "
Short course 16—Bankers' Seminar	$288.73	" "
Short course 17—Soil School	$93.50	" "
Short course 24—Small Farms Course	$661.66	" "
Short course 25—Livestock Appraisal (No. 1)	$389.50	" "
Short course 26—Livestock Appraisal (No. 2)	$(262.06)	" "
Short course 29—Community Plant Control	$(43.18)	" "
Short course 31—Noxious Plant Seminar	$(38.00)	" "
Short course 33—Pest Control Lucerne	$(9.00)	" "
Short course 36—Livestock Appraisal (No. 3)	$168.35	" "
Short course 37—Livestock Appraisal (No. 4)	$(107.33)	" "
Short course 38—Farming Seminar	$(429.90)	" "
Short course 39—Establishment of Small Farms	$1,133.02	" "
Short course 40—Bee Control	$(1.00)	" "
Short course 41—Lamb Appraisal	$(33.57)	" "
Short course 42—Soil Course	$(37.02)	" "
Short course 43—Farm Enterprise	$(57.04)	" "
Short course 44—Nutrition Seminar	$358.85	" "
Short course 45—Trees on Farms	$107.17	" "
Short course 46—Trees on Farms	$162.48	" "
Short course MUR 1—Blow Flies in Sheep	$277.50	" "
Overseas Project—P. R. Hassells	$956.27	" "
Production nursery plants for export	$2,562.18	" "
Ambello Pty Ltd—G. D. Ross	$762.64	" "
Restore museum equipment project	$50.00	" "
Short course 50—Poultry Workshop	$(56.40)	" "
Stock Assessment—Cronulla	$(15.00)	" "
Commonwealth Advisory Laboratory	$1,002.73	" "
Donation to ultrasound research	$1,534.24	" "

NOTE 15. SUPPLEMENTATION OF FUNDS AND TRANSFER OF FUNDS

Schedule B details all supplementation of funds, and transfers of funds between Programs, approved by the Treasury during the financial year.

NOTE 16. SIGNIFICANT VARIATIONS BETWEEN CURRENT AND PREVIOUS YEAR RECEIPTS AND PAYMENTS ACTUALS

Schedule C details significant variations between Current and Previous Year Receipts and Payments Actuals.

NOTE 17. SIGNIFICANT VARIATIONS BETWEEN APPROPRIATION AND ESTIMATES, AND ACTUAL RESULTS

Schedule D details significant variations detected between Appropriation and Estimates, and Actual Results.

NOTE 18. RECONCILLIATION OF SPECIAL DEPOSIT ACCOUNT FIGURES APPEARING IN TABLE B BALANCES AS PER TABLE C.

	$'000	$'000
Total of Special Deposit Account balances as at 1 July 1987 as per Table C		15,404
Add: Receipts as per Table B	21,156	
Inter-Fund Transfers as per Table B	8,685	29,841
		45,245
Less: Payments as per Table B		29,020
		16,225
Add: Departmental Expenditure against Treasury Accounts—		
(i) Treasury Fire Risk Account Treasury Account No. 1449	33	
(ii) Special grant for purchase of computer equipment Treasury Account No. 1784	1,129	1,162
		17,387
Less: Amount overabstracted in Special Deposit Accounts in 1987–88		117
TOTAL OF SPECIAL DEPOSIT ACCOUNT BALANCES AS AT 30 JUNE 1988		**17,270**

NOTE 19. RECONCILIATION OF CONSOLIDATED FUND PAYMENTS WITH PUBLIC ACCOUNTS

	$'000
Consolidated Fund Expenditure as per Table B	141,385
Add: Adjusting abstract in 1987–88 for payments made in 1986–87	117
CONSOLIDATED FUND EXPENDITURE AS PER PUBLIC ACCOUNTS	**141,502**

SCHEDULE A—SCHEDULE OF UNCOLLECTED AMOUNTS AS AT 30.6.1988

Classification	Current	30–60 days	60–90 days	90 days and over	Total
	$	$	$	$	$
Laboratory testing charges	57,836	5,238	4,247	29,954	97,275
Seed certification fees	18,892		4,484	1,285	24,661
Sale of publications	4,848	1,006	1,678	4,071	11,603
Graham Park breeding services	40,462		17,314	6,357	64,133
Recovery of employer's liability for superannuation	435	8,585	3,075	17,506	29,601
Recovery of bond liability				22,418	22,418
Recovery of salary overpayments	2,096		60	1,387	3,543
Recovery—consultancy fees	5,200				5,200
Recoupment of salary costs for officers on loan	27,805	24,420	1,374	10,219	63,818
Apiaries registration fees				12,000	12,000
Swine Brand registration fees				4,020	4,020
Fleece Measurement Service	5,816	2,002	858	4,714	13,390
Board of Tick Control—overtime charges		496	51	4	551
Dipping fees	40	560	1,940	6,224	8,764
Sale of farm produce/government property	5,139	4,428	2,091	16,613	28,271
Recoupment of telephone charges	124			1	125
Recoupment of costs under Section 18A Plant Diseases Act	21,652	23,441	9,723	16,313	71,129
Sheep meat testing	1,733	498		2,579	4,810
Student board & lodging fees	2,685	3,217	11,134	5,000	22,036
Sale of herbicide		898		9,318	10,216
Herd recording fees	15,789	686		1,166	17,641
Sale of emergency tail tags	374	102		106	582
Witness fees		75	105	614	794
Fat sample testing	38,060	37,120	155,280		230,460
Recoupment of expenses	5,200	5,671	3,098	1,002	14,971
Inland angling licences		2,198	6,868	10,418	19,484
Drought fodder relief payments				3,763	3,763
Miscellaneous services	2,017			1,856	3,873
TOTAL	256,203	120,641	223,380	188,908	789,132

SCHEDULE B—SUPPLEMENTATION AND TRANSFER OF FUNDS APPROVED BY THE TREASURY

Horticulture program

Salary and payments in the nature of salary:	
A100 salaries, wages and allowances	$7,100
Maintenance and working expenses:	
B101 Workers Compensation insurance	$28,877
B Total maintenance and working expenses	$(44,649)
Plant and equipment:	
C003 Other major plant and equipment	$20,050
Other services:	
E071 Eradication of potato cyst nematode	$(1,280)
E Virus tested fruits	$(500)
	$8,598

Field crops and pastures program

Salary and payment in the nature of salary:	
A100 Salaries, wages and allowances	$309,900
A200 Payments for leave on retirement, resignation etc.	$121,000
Maintenance and working expenses:	
B101 Workers Compensation insurance	$(13,188
B Total maintenance and working expenses	$183,590
Plant and equipment:	
C003 Other major plant and equipment	$218,749
Other services:	
E Control of legume inoculant quality	$1,280
	$821,331

Plant quarantine and export services program

Maintenance and working expenses:	
B101 Workers compensation insurance	$786
Plant and equipment:	
C003 Other major plant and equipment	$44,000
	$44,786

Extensive animal industries program

Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	$(42,100)
A200 Payments for leave on retirement, resignation, etc.	$197,000
Maintenance and working expenses:	
B101 Workers Compensation insurance	$16,824
B Total maintenance and working expenses	$45,750
Grants and subsidies:	
D021 Wild dog destruction	$(7,000)
Other services:	
E Eradication of rabbits and feral pigs	$7,000
	$217,474

Intensive animal industries program

Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	$2,000
A200 Payments for leave on retirement, resignation, etc.	$25,000
Maintenance and working expenses:	
B101 Workers Compensation insurance	$4,893
B Total maintenance and working expenses	$10,021
Other services:	
E083 Beekeepers' compensation	$14,000
	$55,914

Animal health services program

Salary and payments in the nature of salary:	
A100 Salaries, wages and allowances	$19,000
A200 Payments for leave on retirement, resignation etc.	$253,000
Maintenance and working expenses:	
B101 Workers Compensation insurance	$(104,931)
B Total maintenance and working expenses	$9,800
	$176,869

Marine fisheries—Regulation and management program

Salary and payments in the nature of salary:	
A200 Payment for leave on retirement, resignation, etc.	$40,000
Maintenance and working expenses:	
B101 Workers Compensation insurance	$(683)
B Total maintenance and working expenses	$46,300
	$85,617

Maintenance and working expenses:

B101 Workers Compensation insurance	$167
B Total maintenance and werking expenses	$178,800
	$178,967

Inland fisheries—Regulation and management program

Maintenance and working expenses:	
B101 Workers Compensation insurance	$11,378
B Total maintenance and working expenses	$4,850
	$16,228

Inland fisheries—Research and development program

Maintenance and working expenses:	
B101 Workers Compensation insurance	$215
B Total maintenance and working expenses	$(11,550)
Plant and equipment:	
C003 Other major plant and equipment	$30,000
	$18,665

Technical services program

Salary and payments in the nature of salary:	
A200 Payment for leave on retirement, resignation etc.	$150,000
Maintenance and working expenses:	
B101 Workers Compensation insurance	$20,667
B Total maintenance and working expenses	$(61,100)
Other services	
E Recalled organochloride pesticides	$1,050,000
	$1,159,567

Education program

Maintenance and working expenses:	
B101 Workers Compensation insurance	$8,748
B Total maintenance and working expenses	$(18,000)
Other services:	
E103 Support of agricultural courses at departmental colleges	$70,000
	$60,748

Agricultural services grants program

Maintenance and working expenses:	
B101 Workers Compensation insurance	$170
B Total maintenance and working expenses	$(300)
Grants and subsidies:	
D Australian Journal of Experimental Agriculture and Animal Husbandry	$1,100
Other services:	
E NSW Sugar Adjustment Assistance	$3,600,000
E Australian Bibliography of Agriculture	$(600)
	$3,600,370

Marketing services program:

Maintenance and working expenses:	
B101 Workers Compensation insurance	$3,755
B Total maintenance and working expenses	$(5,700)
	$(1,945)

Economic services program

Maintenance and working expenses:

B101 Workers Compensation insurance	$2,879
B Total maintenance and working expenses	$(22,600)
	$(19,721)

Maintenance and working expenses:

B101 Workers Compensation insurance	$1,103
B Total maintenance and working expenses	$(7,900)
	$(6,797)

Administrative support services program

Salary and payments in the nature of salary:

A200 Payments for leave on retirement, resignation, etc.	$110,000
Maintenance and working expenses:	
B1 Workers Compensation insurance	$19,340
	$129,340

SCHEDULE C—SUMMARY OF SIGNIFICANT VARIATIONS BETWEEN CURRENT AND PREVIOUS YEAR—RECEIPTS AND PAYMENTS ACTUALS

Consolidated Fund recurrent receipts

1. Receipts for services rendered—Registration fees

1986–87 Actual $841,000 1987–88 Actual $1,116,000. Variation due to increase in volume and fee charges for various registration fees administered by the Department, including:

(a) Apiary registration fees $80,972 ($31,889 1986–87)—increase due to biannual registration fees received 1987–88.

(b) Registration of pesticides $184,482 ($78,193 1986–87—increase due to triannual registration fees received 1987–88.

(c) Registration of swine brands $46,560 ($35,906 1986–87)—increase due to biannual registration fees received 1987–88.

(d) Registration of stock foods $128,330 ($38,009 1986–87)—introduction of ability to pay registration fees up to three years in advance—resulting in pre-payment of registration fees during 1987–88.

(e) Registration of stock medicines $228,841 ($161,467 1986–87)—increase in volume of licences granted for registration of stock medicines during 1987–88.

(f) Veterinary surgeons' roll fees $145,390 ($87,368 1986–87)—increase in veterinary surgeons' roll fee registration charges by 60%.

(g) Broiler growing agreements $26,360 ($13,160 1986–87)—increase due to collection of outstanding broiler growers' registration fees.

Reduction in receipts during 1987–88 was incurred in the following items:

(h) Registration of veterinary hospitals $29,960 ($39,003 1986–87)—reduction due to restructuring of registration fee charges for veterinary hospitals.

(i) Registration of poultry processors' fees $133,343 ($241,720 1986–87)—reduction due to (i) decrease in the number of poultry processing plants; and (ii) issue of 1987–88 registration fee notices during April 1987 resulted in early receipt of such fees during 1986–87.

2. Other receipts—Miscellaneous receipts

1986–87 Actual $1,255,000 1987–88 Actual $1,969,000. Variation due mainly to (a) reimbursement of costs, amounting to $390,000, incurred by the Department in previous years in association with the Agricultural Assistance in China project; and (b) increase in repayment—Credit of Vote Previous Year by $593,000 relating to over accrual of overtime and temporary assistance.

Consolidated Fund recurrent payments

Fringe benefits taxation

1986–87 Actual $214,000 1987–88 Actual $286,000. Variation due to 1986–87 actual calculation based on a nine months costing, whilst 1987–88 actual calculated on a full year basis.

SCHEDULE D—SIGNIFICANT VARIATIONS BETWEEN APPROPRIATION AND ESTIMATES, AND ACTUAL RESULTS

(This schedule does not form part of the accounts subject to audit)

Consolidated Fund Recurrent Payments

1. *Salaries and other employee payments*

Payments for leave on retirement, resignation etc.
Estimate $2,109,000 Actual $2,424,000. Variation due to an increase in early retirements and resignations. Supplementation to the value of $896,000 approved.

2. *Maintenance and working expenses*

   (a) Employer's contribution to superannuation schemes.
   Estimate $854,000 Actual $1,124,000. Variation due to introduction of State Authorities Superannuation Scheme, effective from 1.4.88; and, increase in contributions to the State Public Service Superannuation Fund.

   (b) Travelling, removal and subsistence expenses.
   Estimate $4,018,000 Actual $3,606,000. Variation due to unexpected downturn in this item.

   (c) Stores, provisions, furniture, equipment, minor plant etc.
   Estimate $7,928,000 Actual $9,895,000. Variation due to increased costs and additional demand for services.

   Offset savings within other maintenance and working expenses items achieved, and net supplementation of funds for the above variations to the value of $287,972 approved.

3. *Plant and equipment*

   Other plant and equipment.
   Estimate $635,000 Actual $865,000. Variation due to additional costs associated with work undertaken by the Department on behalf of the Commonwealth for Plant Export matters, and research projects undertaken on behalf of the Commonwealth for Salinity Control, Murray-Darling Basin Research Initiative, and Australian Rural Research Council. Supplementation to the value of $312,800 approved.

4. *Other services*

   (a) Support for agricultural courses at departmental colleges.
   Estimate $105,000 Actual $155,000. Additional expenditure necessitated by need to cover expenditure of Commonwealth funds for purchase of Plant and Equipment. Supplementation to the value of $70,000 approved.

   (b) Recalled organochloride pesticides.
   Estimate $0. Actual $1,050,000. Expenditure associated with the collection and disposal of banned organochloride pesticides. Supplementation to the value of $1,050,000 approved.

   (c) NSW Sugar Adjustment Assistance.
   Estimate $0. Actual $2,669,000. Expenditure incurred in joint Commonwealth–State participation in providing adjustment assistance to the N.S.W. Sugar Industry. Supplementation to the value of $3,600,000 approved.

Consolidated Fund—Capital works and services

Elizabeth Macarthur Institute, Camden Park.
Estimate $5,823,000 Actual $9,861,000.
Supplementation to the value of $4,038,000 was approved to meet increased expenditure associated with the accelerated progress of this project.

Table A.1. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Accounts by item for the year ended 30 June 1988.

Details	Note	1986–87 Actual	1987–88 Estimate	1987–88 Actual
		$'000	$'000	$'000
RECEIPTS				
Receipts For Services Rendered				
Registration Fees	Note 17	923	0	1116
Miscellaneous Services		2469	0	2614
		3392	0	3730
Commonwealth Contributions				
Plant Quarantine Services		3138	0	3408
Commerce (Trade Descriptions) Act	}	1234}	0	1497
Overtime (Export and Import Branch)	}	77}		
CSIRO Cotton Research		62	0	0
Animal Quarantine Services		1038	0	939
Animal Export Services		207	0	217
Commonwealth Fisheries		402	0	381
	Note 13(b)	6158	0	6442
Grants and Subsidies				
Employment Schemes	Note 17	3728	0	1082
Industry Funds		5432	0	5347
Working Accounts	Note 17	4887	0	9582
Commonwealth Subsidy—Egg Marketing Board	Note 17	2644	0	796
		16691	0	16807
Other				
Sale of Assets, Farm Produce, Government Property and Publications		2286	0	2222
Levies (Noxious Insects Destruction Account)		1197	0	1198
Sale of Fisheries Licences and Fees	Note 17	1063	0	1233
Receipts Fisheries and Oyster Farms Act		770	0	819
Employer's Superanuation Contributions		677	0	545
Miscellaneous Receipts	Note 17	1255	0	1969
		7248	0	7986
Sub-total Receipts		33489	0	34965
Balance of Salaries	Note 8	1592	0	1569
TOTAL—RECEIPTS	Note 1(e,f,g)	35081	13936	36534

Table A.2. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Accounts by item for the year ended 30 June 1988.

Details	Note	1986–87 Actual	1987–88 Estimate	1987–88 Actual
		$'000	$'000	$'000
PAYMENTS				
Salaries and other employee payments:				
Salaries, Wages and Allowances	Note 17	96084	81293	93424
Payments for Leave on Retirement, Resignation etc.	Note 16	2897	2109	2478
Overtime		1231	1031	1185
Inter-Fund Transfers	Note 2	-7424	0	-5001
TOTAL SALARIES AND OTHER EMPLOYEES PAYMENTS	Note 1(e)&(f)	92788	84433	92086
Maintenance and Working Expenses				
Subsidiary Staff Charges				
Workers Compensation Insurance		2189	1310	1375
Meal Allowances		68	43	55
Payroll Tax		1496	804	1263
Employers Contribution to Superannuation Schemes	Note 16	832	854	1226
Fringe Benefits Tax	Note 17	243	324	318
Long Service Leave		103	104	104
Expenses in Connection with Buildings				
Rent		1002	1201	1197
Payments of Rates, Charges etc.		406	409	375
Cleaning		84	58	81
Maintenance Alterations Additions and Renewals		1958	2082	2125
Subsistence and Transport Expenses				
Travelling Removal and Subsistence Expenses	Note 16	4479	4018	4639
Motor Vehicles—Running Costs Maintenance, Hire and Insurance		2993	2664	2997
Marine Craft—Running Costs		465	423	360
Freight, Cartage and Packing		270	262	257
General Expenses				
Advertising and Publicity		152	135	123
Books, Periodicals and Papers		625	437	535
Postal and Telephone Expenses		3064	2925	3150
Fees for Services Rendered		3080	3086	3530
Stores, Provisions, Furniture, Equipment, Minor Plant etc. (including Maintenance and Repairs)	Note 16	14642	7928	13332

Table A.3. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Accounts by item for the year ended 30 June 1988.

		1986–87	1987–88	
Details	Note	Actual	Estimate	Actual
		$'000	$'000	$'000
PAYMENTS (continued)				
Printing and Stationery		1101	1162	1301
Gas and Electricity		2105	2120	2209
Laundry Expenses		23	20	22
Other Insurances		25	27	35
Minor Expenses (not elsewhere included)		35	112	133
Payments—General	Note 17	4658	0	2716
Cattle Compensation—Payments		429	0	864
Inter-Fund Transfers	Note 2	-3745	0	-2904
TOTAL MAINTENANCE AND WORKING EXPENSES	Note 1(e)&(f)	42782	32508	41418
Plant and Equipment				
Purchase of Motor Vehicles		1064	648	1133
Other Plant and Equipment	Note 16	1372	635	3624
Purchase of Marine Craft		264	315	344
Purchase of Equipment for Fisheries Inspectors		46	49	47
Inter-Fund Transfers	Note 1	-618	0	-672
TOTAL PLANT AND EQUIPMENT	Note 1(e)&(f)	2128	1647	4476
Grants and Subsidies				
Organisation of Agricultural Bureau and Branches		1	2	1
District Exhibits at Royal Agricultural Society Show		50	50	50
Australian Journal of Experimental Agriculture and Animal Husbandry		27	29	29
Agriculture Societies Council of New South Wales		1	1	1
C. B. Alexander Foundation		5	5	5
Rural Youth Organisation of N.S.W		5	0	0
Commonwealth Agricultural Bureaux		59	36	37
Destruction of Noxious Weeds		2500	2500	2500
Tobacco Research		5	5	5
Pasture Protection Boards		38	15	15
Wild Dog Destruction		58	65	51
Rural Counsellors—Contribution		15	120	82
Share of Underwriting, Bicentenary Wool Conference		0	10	10
Share of Underwriting, International Bee Conference		0	6	0
TOTAL GRANTS AND SUBSIDIES	Note 1(e)&(f)	2764	2844	2786

Table A.4. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Accounts by item for the year ended 30 June 1988.

Details	Note	1986–87	1987–88	
		Actual	Estimate	Actual
		$'000	$'000	$'000
PAYMENTS (continued)				
Other Services				
Overseas Visits		59	35	13
NSW Institute of Rural Studies—Expenses		5	6	4
'Tocal' Homestead Maintenance		25	27	27
Management of Australian Bibliography of Agriculture		17	18	17
Contribution Toward Expenses of Visiting Overseas Specialists		8	12	12
Maintenance and Allocation of Travelling Stock Routes		17	100	100
Expenses in Connection with Food Preserving Problems		90	98	98
Fruit Fly—Suppression Program—Expenses		35	35	35
Plant Quarantine Publicity Campaign—States Share of Cost		36	39	39
Contribution towards Investigations into Commodity Treatment of Fresh Fruits		20	25	20
Contribution towards Repositories for Virus Tested Fruit Varieties		22	24	20
Eradication Campaign—The Green Snail (*Helix aperta*)		11	11	10
Noxious Plants Advisory Committee		26	28	28
Agricultural Scientific Collections Trust		15	15	15
Repairs to Roads		78	70	70
Support of Agricultural Courses at Departmental Colleges	Note 16	118	105	155
Control of Legume Inoculant Quality in Australia—States Share		14	16	17
Compensation to Beekeepers		22	19	33
Eradication of Rabbits and Feral Pigs on Unoccupied Crown Lands		12	14	20
Chicken Meat Industry Committee—Expenses		12	19	16
Exotic Disease Feral Animal Control Study		83	0	0
Compensation (Cattle Tick Control)		0	1	0
Fencing and Other Facilities		49	239	239
Cattle Tick Research		52	58	58
NSW Amatuer Fishermens' Advisory Council—Expenses		13	13	12
Meshing of Sharks		257	317	298
Purchase of Oyster Lease Signs		11	15	10
Eradication of Potato Cyst Nematode		11	11	10
Diseased Strawberry Plants		375	0	0
Contribution to Danish Seine Research		81	87	87
Repayment of Treasury Loan		16	0	0
Recalled Organochloride Pesticides	Note 16	0	0	1050
NSW Sugar Adjustment Assistance	Note 16	0	0	2669
Inter-Fund Transfers	Note 2	-33	0	-108

Table A.5. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Accounts by item for the year ended 30 June 1988.

Details	Note	1986–87 Actual	1987–88 Estimate	1987–88 Actual
		$'000	$'000	$'000
PAYMENTS (continued)				
TOTAL OTHER SERVICES		1557	1457	5074
Balance of Salaries		718	0	1592
Sub-Total	Note 1(e)&(f)	142737	122889	147432
Capital Works and Services				
Yanco Agricultural Institute—Stage 2—Advisory Complex		5	0	0
Dutton Trout Hatchery—Ebor Tourist Facilities		138	0	0
Office/Laboratory Extensions—Gosford		38	0	0
Elizabeth Macarthur Institute—Camden Park	Note 16	676	5823	9861
Oyster Hatchery—Port Stephens		373	748	631
Biological & Chemical Research Institute—Building Works		1154	525	570
Agricultural Research Centre, Tamworth—Extensions		12	0	0
Replacement Cottage—Alstonville		10	0	0
Boatshed and Facilities		104	0	0
Office and Boatshed, Merimbula		95	0	0
Agric. Research Centre, Trangie—Laboratory Extensions		74	0	0
Temora and Deniliquin—Outreach Centre		216	0	14
Deniliquin—Field Stations		0	150	154
C. B. Alexander, Tocal—Extensions		10	1257	1023
Purchase of Cottage—Woy Woy		80	0	0
Advisory Officers & Prickly Pear Commission—Accommodation, Mudgee		123	0	0
Purchase of Land—Deniliquin		80	0	0
Relocate Board of Tick Control Laboratories		0	0	113
Repairs—Bathurst Fisheries Cottage		0	0	75
Acquisition of Plant and Equipment, and Maintenance (Roads and Cottages)		2000	2201	1847
TOTAL CAPITAL WORKS AND SERVICES		5188	10704	14288
TOTAL PAYMENTS		147925	133593	161720
EXCESS OF PAYMENTS OVER RECEIPTS		112844	119657	125186

Table B.1. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Account by program for the year ended 30 June 1988.

		RECEIPTS				PAYMENTS		
		1986–87	1987–88			1986–87	1987–88	
DETAILS	NOTE	ACTUAL	ESTIMATE	ACTUAL	NOTE	ACTUAL	ESTIMATE	ACTUAL
		$'000	$'000	$'000		$'000	$'000,000	
HORTICULTURE PROGRAM								
Consolidated Fund		304	266	253	Note 15	13651	12795	13152
Special Deposits Account		963	0	950		809	0	925
Gross Total		1267	266	1203		14460	12795	14077
less Inter-fund transfers		0	0	0	Note 2	0	0	50
Net Total		1267	266	1203		14460	12795	14027
FIELD CROPS and PASTURES PROGRAM								
Consolidated Fund		692	414	850	Note 15	27916	27935	29270
Special Deposits Account		3815	0	3649		4628	0	5531
Gross Total		4507	414	4499		32544	27935	34801
less Inter-fund transfers		0	0	0	Note 2	1410	0	801
Net Total		4507	414	4499		31134	27935	34000
PLANT QUARANTINE and EXPORT SERVICES PROGRAM								
Consolidated Fund		4910	5436	5440	Note 15	4799	4996	4914
Special Deposits Account		144	0	23		47	0	157
Gross Total		5054	5436	5463		4846	4996	5071
less Inter-fund transfers		0	0	0		0	0	0
Net Total		5054	5436	5463		4846	4996	5071
EXTENSIVE ANIMAL INDUSTRIES PROGRAM								
Consolidated Fund		2019	1923	2346	Note 15	12500	13047	13293
Special Deposits Account		3748	0	4415		2208	0	2175
Gross Total		5767	1923	6761		14708	13047	15468
less Inter-fund transfers		0	0	0	Note 2	15	0	27
Net Total		5767	1923	6761		14693	13047	15441

Table B.2. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Account by program for the year ended 30 June 1988.

		RECEIPTS				PAYMENTS		
		1986–87	1987–88			1986–87	1987–88	
DETAILS	NOTE	ACTUAL	ESTIMATE	ACTUAL	NOTE	ACTUAL	ESTIMATE	ACTUAL
		$'000	$'000	$'000		$'000	$'000	$'000
INTENSIVE ANIMAL INDUSTRIES PROGRAM								
Consolidated Fund		339	342	309	Note 15	2414	2524	2536
Special Deposits Account		3155	0	1791		3291	0	1583
Gross Total		3494	342	2100		5705	2524	4119
less Inter-fund transfers		0	0	0	Note 2	0	0	27
Net Total		3494	342	2100		5705	2524	4092
ANIMAL HEALTH INDUSTRIES PROGRAM								
Consolidated Fund		2140	3872	2370	Note 15	26569	29950	32652
Special Deposits Account		1691	0	4007		5195	0	3925
Gross Total		3831	3872	6377		31764	29950	36577
less Inter-fund transfers		0	0	0	Note 2	4544	0	1289
Net Total		3831	3872	6377		27220	29950	35288
MARINE FISHERIES—REGULATION and MANAGEMENT PROGRAM								
Consolidated Fund		1309	115	1296	Note 15	4373	4384	4632
Special Deposits Account		127	0	324		92	0	103
Gross Total		1436	115	1620		4465	4384	4735
less Inter-fund transfers		0	0	0		0	0	0
Net Total		1436	115	1620		4465	4384	4735
MARINE FISHERIES—RESEARCH and DEVELOPMENT PROGRAM								
Consolidated Fund		0	0	0	Note 15	3997	4714	4685
Special Deposits Account		1337	0	544		4345	0	4639
Gross Total		1337	0	544		8342	4714	9324
less Inter-fund transfers		0	0	0	Note 2	3543	0	4046
Net Total		1337	0	544		4799	4714	5278

Table B.3. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Account by program for the year ended 30 June 1988.

		RECEIPTS				PAYMENTS		
		1986–87	1987–88			1986–87	1987–88	
DETAILS	NOTE	ACTUAL	ESTIMATE	ACTUAL	NOTE	ACTUAL	ESTIMATE	ACTUAL
		$'000	$'000	$'000		$'000	$'000	$'000
INLAND FISHERIES—REGULATION and MANAGEMENT PROGRAM								
Consolidated Fund		82	0	40	Note 15	821	869	872
Special Deposits Account		1259	0	1250		1868	0	1950
Gross Total		1341	0	1290		2689	869	2822
less Inter-fund transfers		0	0	0	Note 2	822	0	797
Net Total		1341	0	1290		1867	869	2025
INLAND FISHERIES—RESEARCH and DEVELOPMENT PROGRAM								
Consolidated Fund		66	0	30	Note 15	1630	1623	1667
Special Deposits Account		15	0	79		1709	0	1785
Gross Total		81	0	109		3339	1623	3452
less Inter-fund transfers		0	0	0	Note 2	1486	0	1648
Net Total		81	0	109		1853	1623	1804
TECHNICAL SERVICES PROGRAM								
Consolidated Fund		252	134	592	Note 15	12420	13173	14386
Special Deposits Account		241	0	164		143	0	152
Gross Total		493	134	756		12563	13173	14538
less Inter-fund transfers		0	0	0		0	0	0
Net Total		493	134	756		12563	13173	14538
EDUCATION PROGRAM								
Consolidated Fund		700	533	712	Note 15	4504	5934	5689
Special Deposits Account		242	0	409		184	0	1434
Gross Total		942	533	1121		4688	5934	7123
less Inter-fund transfers		0	0	0		0	0	0
Net Total		942	533	1121		4688	5934	7123

Table B.4. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Account by program for the year ended 30 June 1988.

		RECEIPTS				PAYMENTS		
		1986–87	1987–88			1986–87	1987–88	
DETAILS	NOTE	ACTUAL	ESTIMATE	ACTUAL	NOTE	ACTUAL	ESTIMATE	ACTUAL
		$'000	$'000	$'000		$'000	$'000	$'000
AGRICULTURAL SERVICES GRANT PROGRAM								
Consolidated Fund		0	0	0	Note 15	363	433	3058
Special Deposits Account		1	0	0		0	0	0
Gross Total		1	0	0		363	433	3058
less Inter-fund transfers		0	0	0		0	0	0
Net Total		1	0	0		363	433	3058
MARKETING SERVICES PROGRAM								
Consolidated Fund		66	246	2	Note 15	1252	1691	1374
Special Deposits Account		13	0	36		0	0	37
Gross Total		79	246	38		1252	1691	1411
less Inter-fund transfers		0	0	0		0	0	0
Net Total		79	246	38		1252	1691	1411
ECONOMIC SERVICES PROGRAM								
Consolidated Fund		0	0	0	Note 15	1324	1403	1429
Special Deposits Account		18	0	0		22	0	64
Gross Total		18	0	0		1346	1403	1493
less Inter-fund transfers		0	0	0		0	0	0
Net Total		18	0	0		1346	1403	1493
OVERSEAS PROJECTS PROGRAM								
Consolidated Fund		15	486	398	Note 15	380	474	447
Special Deposits Account		768	0	186		600	0	160
Gross Total		783	486	584		980	474	607
less Inter-fund transfers		0	0	0		0	0	0
Net Total		783	486	584		980	474	607

Table B.5. Summarised receipts and payments statement of the Consolidated Fund and the Special Deposits Account by program for the year ended 30 June 1988.

DETAILS	NOTE	RECEIPTS			NOTE	PAYMENTS		
		1986–87 ACTUAL	1987–88 ESTIMATE	1987–88 ACTUAL		1986–87 ACTUAL	1987–88 ESTIMATE	1987–88 ACTUAL
		$'000	$'000	$'000		$'000	$'000	$'000
ADMINISTRATIVE SUPPORT SERVICES								
Consolidated Fund		313	169	740	Note 15	7297	7648	7329
Special Deposits Account		609	0	653		424.	0	496
Gross Total		922	169	1393		7721	7648	7825
less Inter-fund transfers		0	0	0		0	0	0
Net Total		922	169	1393		7721	7648	7825
NON-PROGRAM RECEIPTS and PAYMENTS								
Consolidated Fund		0	0	0		0	0	0
Special Deposits Account		3728	0	2676		7970	0	3904
Gross Total		3728	0	2676		7970	0	3904
less Inter-fund transfers		0	0	0		0	0	0
Net Total		3728	0	2676		7970	0	3904
TOTAL								
Consolidated Fund		13207	13936	15378	Note 15, 19	126210	133593	141385*
Special Deposits Account		21874	0	21156		33535	0	29020
GRAND TOTAL—GROSS		35081	13936	36534		159745	133593	170405
less Inter-fund transfers		0	0	0	Note 2	11820	0	8685
GRAND TOTAL—NET		35081	13936	36534		147925	133593	161720

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* Includes Special Appropriation totalling $184,609 comprising $124,609 for Employer's State Superannuation Contributions and $60,000 to the Prickly Pear Destruction Fund.

Table C.1. Statement of special deposit account balances as at 30 June 1988.

Previous year Cash	Previous year Securities	Previous year Total	Account	1987–88 Cash	1987–88 Securities	1987–88 Total
$'000	$'000	$'000		$'000	$'000	$'000
4460	0	4460	Sundry Deposits Treasury Account No. 0642	4559	0	4559
936	0	936	Tuberculosis and Brucellosis Eradication Campaign Working Account Treasury Account No. 0643	28	0	28
71	0	71	Australian Extension Services Grant Treasury Account No. 0710	69	0	69
4468	0	4468	Cattle Compensation Fund Treasury Account No. 1404	506	5750	6256
13	0	13	Inland Fisheries Fund Treasury Account No. 1426	52	0	52
1764	0	1764	Noxious Insects Destruction Account Treasury Account No. 1433	2144	0	2144
121	0	121	Prickly Pear Destruction Working Account Treasury Account No. 1437	15	0	15
108	1550	1658	Swine Compensation Fund Treasury Account No. 1446	210	1550	1760
274	0	274	Commercial Fisheries Exploration and Development Fund Treasury Account No. 1602	483	0	483
1	0	1	Tidal Angling Fund Treasury Account No. 1669	35	0	35
1	0	1	Tobacco Industry Trust Treasury Account No. 1670	15	0	15
4	0	4	Wheat Industry Stabilisation Fund Treasury Account No. 1701	0	0	0
28	0	28	Commonwealth Fisheries Act Treasury Account No. 1749	211	0	211
(5)	0	(5)	Motor Vehicle Advances Treasury Account No. 0602	0	0	0
(6)	0	(6)	Advance to be Recovered—Bega Dairy Demonstration Farm Treasury Account No. 1108	(6)	0	(6)

Table C.2. Statement of special deposit account balances as at 30 June 1988.

Previous year Cash	Previous year Securities	Previous year Total	Account	1987–88 Cash	1987–88 Securities	1987–88 Total
$'000	$'000	$'000		$'000	$'000	$'000
1592	0	1592	Balance of Salaries—Adjustment Treasury Account No. 1140	1569	0	1569
0	0	0	Provision for Commitments Outstanding Treasury Account No. 1820	55	0	55
16	0	16	Unclaimed Moneys Account Treasury Account No. 1964	15	0	15
8	0	8	Agricultural Scientific Collections Trust Account Treasury Account No. 1470	10	0	10
13,854	1550	5,404	Total Special Deposits Accounts(See Note 18)	9,970	7300	17,270

Table D.1. Disclosure of receipts and payments dissections.
A. The table below details the program receipts of Consolidated Fund and Special Deposits Accounts. The figures shown are net of inter-fund transfers.

Previous year receipts	Program description	Receipt for services rendered	Commonwealth contributions	Grants and subsidies	Other	Total receipts
$'000		$'000	$'000	$'000	$'000	$'000
1267	HORTICULTURE PROGRAM	35	0	912	256	1203
4507	FIELD CROPS AND PASTURES PROGRAM	467	0	3639	393	4499
5054	PLANT QUARANTINE AND EXPORT SERVICES	0	4905	23	535	5463
5767	EXTENSIVE ANIMAL INDUSTRIES PROGRAM	1317	0	3100	2344	6761
3494	INTENSIVE ANIMAL INDUSTRIES PROGRAM	292	0	1791	17	2100
3831	ANIMAL HEALTH INDUSTRIES PROGRAM	689	1156	4150	382	6377
1436	MARINE FISHERIES-REGULATION AND MANAGEMENT PROGRAM	29	381	133	1077	1620
1337	MARINE FISHERIES-RESEARCH AND DEVELOPMENT PROGRAM	0	0	544	0	544
1341	INLAND FISHERIES-REGULATION AND MANAGEMENT PROGRAM	0	0	0	1290	1290
81	INLAND FISHERIES-RESEARCH AND DEVELOPMENT PROGRAM	8	0	41	60	109
493	TECHNICAL SERVICES PROGRAM	228	0	109	419	756
942	EDUCATION PROGRAM	662	0	409	50	1121
1	AGRICULTURAL SERVICES GRANT PROGRAM					
79	MARKETING SERVICES PROGRAM	0	0	36	2	38
18	ECONOMIC SERVICES PROGRAM	0	0	0	0	0
783	OVERSEAS PROJECTS PROGRAM	0	0	186	398	584
922	ADMINISTRATIVE SUPPORT PROGRAM	3	0	653	737	1393
3728	NON-PROGRAM RECEIPTS	0	0	1081	1595	2676
35081	TOTAL	3730	6442	16807	9555	36534

Table D.2. Disclosure of receipts and payments dissections.
B. The table below details the program payments of programs financed from Consolidated Fund and Special Deposits Accounts. The figures shown are net of inter-fund transfers.

Previous year payments	Program description	Salaries and other employee payments	Maintenance and working expenses	Capital works	Other	Total payments
$'000		$'000	$'000	$'000	$'000	$'000
14460	HORTICULTURE PROGRAM	10200	3072	446	309	14027
31134	FIELD CROPS AND PASTURES PROGRAM	21548	8103	977	3372	34000
4846	PLANT QUARANTINE AND EXPORT SERVICES	3224	1628	0	219	5071
14693	EXTENSIVE ANIMAL INDUSTRIES PROGRAM	9961	4568	192	720	15441
5705	INTENSIVE ANIMAL INDUSTRIES PROGRAM	1920	2051	34	87	4092
27220	ANIMAL HEALTH INDUSTRIES PROGRAM	16814	7615	10245	614	35288
4465	MARINE FISHERIES-REGULATION AND MANAGEMENT PROGRAM	2523	1492	52	668	4735
4799	MARINE FISHERIES-RESEARCH AND DEVELOPMENT PROGRAM	2850	1519	635	274	5278
1867	INLAND FISHERIES-REGULATION AND MANAGEMENT PROGRAM	1072	601	80	272	2025
1853	INLAND FISHERIES-RESEARCH AND DEVELOPMENT PROGRAM	963	710	18	113	1804
12563	TECHNICAL SERVICES PROGRAM	8178	4770	527	1063	14538
4688	EDUCATION PROGRAM	2827	1606	1037	1653	7123
363	AGRICULTURAL SERVICES GRANT PROGRAM	74	34	0	2950	3058
1252	MARKETING SERVICES PROGRAM	846	554	11	0	1411
1346	ECONOMIC SERVICES PROGRAM	1245	239	0	9	1493
980	OVERSEAS PROJECTS PROGRAM	373	234	0	0	607
7721	ADMINISTRATIVE SUPPORT PROGRAMS	5448	2330	34	13	7825
7970	NON-PROGRAM PAYMENTS	3612	292	0	0	3904
147,925	TOTAL	93678	41418	14288	12336	161720

APPENDIX 1. STORES AND EQUIPMENT PURCHASES

Monthly Expenditure on stores and equipment purchases during 1987-88 was as follows:

	$
1987	
July	1,035,789
August	1,605,416
September	1,638,112
October	794,315
November	3,287,348
December	1,041,814
1988	
January	814,562
February	807,088
March	885,175
April	725,153
May	683,412
June	13,769

The following information should be considered when examining the above expenditure:

- * Spending during the early months was higher than average due to payment of 1986–87 carry-over accounts.
- * Extraordinary expenditure during November 1987 was due to the transfer of Consolidated Fund Grants and Commonwealth Grants, totalling approximately $1.8 million, from Consolidated Fund Recurrent Payments (Stores heading) to Special Deposits Accounts.
- * Spending during June 1988 was low due to early closure of accounts. A graphical presentation of monthly spending is shown below.

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